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An Investigation into CTE Classroom Instructional Strategies

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by

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Abstract

This researcher conducted this *ex post facto* study with the help of career and technical education (CTE) teachers across the country. The research was a survey of classroom instructional strategy usage, a teacher's familial impact on classroom instruction strategies used, and the effects of Covid-19 on classroom strategies used. Data suggested that CTE teachers use different instructional strategies based on teacher demographics and that Covid-19 did have an effect on CTE teachers' use of instructional strategies. This data suggested the five most used classroom instructional strategies were questioning, guided practice, demonstrations, lab activities, and whole group discussion.

Keywords: CTE teacher, classroom instructional strategies, signature pedagogy

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Chapter I: Introduction

Context

Career and technical education (CTE) coursework is designed to prepare students for a career after they graduate from high school or pursue post-secondary education opportunities (Jacob, 2017). As of 2016, over 90% of public high schools offer CTE coursework to students (Musu-Gillette et al., 2016). As of 2019, CTE programs were providing coursework for 14 million students in 26,000 public high schools, 10,000 private secondary schools, and 1,200 two-year community and technical colleges throughout the United States (US Department of Education & National Center for Education Statistics, 2020a). During the 2019/20 school year, the U.S Department of Education and National Center for Education Statistics (2020b) reported that 7.6 million students participated in CTE at the secondary level and 3.5 million students participated at the post-secondary level.

Moore (2015) stated that one goal of CTE is for students to be successful through higher wages and quality of life. A second goal of CTE is to provide the United States with a skilled labor force to improve the economy. Scott and Wircenski (2014) described CTE as programs of study in the areas of agriculture, family and consumer sciences, marketing, health, trade and industry, and technology education. Partnership for 21st Century Skills (2010) broke these categories down further, identifying 16 occupational clusters in CTE: agriculture, food and natural resources; architecture and construction; arts, audio/video technology and communication; business management and administration; education and training; finance; government and public administration; health science; hospitality and tourism; human services; information technology; law, public safety, corrections and security; manufacturing; marketing, sales and service; science, technology, engineering and mathematics; and transportation,

distribution and logistics. The need for these programs to provide high school graduates with workplace skills has increased since the mid-1990s (Xu & Trimble, 2016).

Historically, CTE courses were perceived as a place for unmotivated or underachieving students (Kelly & Price, 2009). Moore (2015) stated that CTE provides students with academic and hands-on experiences that prepare them to enter the workforce. CTE education provides hands-on training and provides students with a wider range of experiences and skills that better equipped to transition into the workforce (Symonds et al., 2011). CTE offers hands-on learning experiences as well as career exploration activities that extend beyond the classroom (U.S. Department of Education & National Center for Reporting Statistics, 2020b).

Several studies have examined the effect of CTE coursework on student outcomes. The Brodersen et al. (2021) stated that students who completed three years of CTE courses in a sequence were 7% higher to graduate from high school on time and 10% higher to graduate from a post-secondary institution than student who did not CTE completers. Brodersen et al. (2021) stated that CTE concentrators were enrolling in a postsecondary institution at a rate 8% higher than students who were not CTE concentrators. Kreisman and Stange (2017) found that students completing upper level CTE coursework make higher wages than students who do not complete upper level CTE coursework. Numerous studies have found that students completing CTE coursework have higher earnings than a similar student who does not complete CTE coursework (e.g., Mane, 1999; Bishop & Mane, 2004, 2005; Neumark & Rothstein, 2006; Meer, 2007; Stern et al., 2010; Page, 2012).

CTE programs incorporate engaging workplace experiences that allow a person to apply academic and technical learning to real-world projects and problems alongside professionals (Moore, 2015). CTE courses and programs of study can be an important segment in gender-

based desegregation of occupations due to the extensive reach of this educational program. All states combined receive over $1.2 billion annually to support CTE, and the programs impact most secondary students in the United States (Wightman, 2020). According to the National Center for Education Statistics (2017), nearly every high school student takes at least one CTE course before graduation while the average student completes four. The U.S. Department of Education and National Center for Education Statistics (2020b) stated that a world-class educational system that provides high-quality job-training opportunities will "reduce skills shortages, spur business growth, encourage new investment and hiring, spark innovation, and promote continued economic growth" (para. 6).

The impact of CTE stretches past increasing income. A 2008 study (Kelly & Price, 2009) indicated that students completing CTE coursework showed improved feelings of self-worth. In an earlier study, Walker et al. (2006) determined that feelings of self-worth and self-efficacy were predictors of student success in school. Finn & Rock (1997) and Fredericks and Eccles (2002) also determined that many students entered high school with a low feeling of self-efficacy. Because CTE coursework increased student self-efficacy, it could be an important factor in student's engagement with school and keeping students from dropping out of high school (Agodini & Deke, 2004; Plank et al., 2008; Kelly & Price, 2009; Rumberger, 2011). Today, however, it is generally agreed that CTE programs are appropriate for a wide range of students and that these programs provide students with academic and hands-on experiences, internship-like experiences, and soft skills that prepare them to enter the workforce, regardless of whether they also pursue additional training after high school (Jacob, 2017; Moore, 2015). Daggett (2005) stated that relevant and rigorous instruction as well as applying it to a relevant and practical setting will increase a students chance for success.

Participation in CTE programs may also affect graduation rates. For example, Dougherty and Lombardi (2016) found that students attending regional and technical high schools in Massachusetts are more likely to graduate than students who do not participate in CTE coursework. The impact of CTE program**s** stretches passed improving graduating rates and increasing income. In a 1997 study**,** Finn and Rock determined that feelings of self-worth and self-efficacy were important predictors of student success in school.

Teacher Education Programs

Teacher quality is an important component in successfully educating students (Darling-Hammond, 2012). Thomas and Loadman (2001) stated that teachers can be the most instrumental factor in solving school problems. Numerous studies have shown that teachers are the greatest in-school contributor to student success (Glazerman et al., 2010; Harris, 2012; Kane & Staiger, 2012; Weisberg et al., 2009). Teacher preparation programs have been charged with preparation of the next generation of teachers and have been under scrutiny for decades (Allen et al., 2017, Darling-Hammond, 2000). For students to learn how to "find, synthesize, analyze, and interpret information" requires a new model of teaching other than memorization (Darling-Hammond, 2012, p. 12).

Some teacher education programs are more focused on subject with less emphasis placed on learning how to teach (Volk, 2019). Cohen and Wyckoff (2016) stated that teacher preparation programs are struggling with standardizing an evaluation process. Derek Lyons, advisor to President George W. Bush stated that colleges of education need major reform (Walsh, 2013). Education Secretary Robert Paige stated that teacher education programs fail to provide high qualified teachers (Brewer, 2006).

Arnett (2016) stated that The Every Student Succeeds Act provides alternate routes to teacher certification in response to the fact that teacher preparation programs have failed to improve teacher quality. Recent more research has focused on effective field and student teaching experiences (Goldhaber et al., 2017), while less research has focused on teacher candidate's coursework. Volk (2019) stated that technology and engineering education teaching programs have a mismatch between the type of teacher being produced and what is currently being taught in schools. According to Rigler (2016, 2017), professional associations and universities have indicated that what is happening in their teacher preparation programs and what is occurring in school may be deterring individuals from entering the teaching profession. Monk (2016) stated that for the field of teacher education to improve, determining what is best practice for preparing future educators needs more research.

Covid-19 and CTE Programs

During the Covid-19 pandemic in the spring of 2020, schools were significantly impacted as communities responded quickly with physical distancing requirements to mitigate the spread of the disease (Gresh et al., 2020). Due to the urgency of the situation, schools closed or transitioned to online learning, often very abruptly and with little or no advance preparation (Cho & Clark-Gareca, 2020). The prolonged school closures created stress for children and adults because of the significant societal changes. Teachers were stressed by the need to quickly learn new distance learning strategies; students were stressed by adapting to different learning methods while being isolated from their teachers and peers; and families were stressed by the need to provide technology and space for learning, and by the need for parents to assist in their children’s learning.

The pandemic has also affected teacher training. Perhaps the most obvious affect is that teacher preparation candidates could not complete their field experiences due to school closures (Cho & Clark-Gareca, 2020), and those field experiences are required for completion of their degree and for certification. While student achievement is a driver of teaching, few studies have examined student outcomes compared to teacher training or how they are prepared (Gansle et al., 2012). Several pre-pandemic studies have found significant variances within each teacher preparation program (Koedel et al., 2015; Papay et al., 2012; Ronfeldt et al., 2014). While the pandemic certainly affected instructional strategies for teachers in all disciplines, at the time of this research, no studies have been found that examine changes in the classroom instructional strategies for CTE courses during the Covid-19 pandemic.

Purpose of the Study

The purpose of this study was to investigate the signature pedagogies currently being used by CTE secondary education teachers in the United States and to determine if specific demographics or the Covid-19 virus has impacted strategies used in the classroom. CTE coursework has a large impact on the economy and many different subject areas. The impact of determining the signature pedagogy could impact how teachers are taught how to teach. New CTE teachers may need to learn new classroom strategies that are more effective and that become more prevalent and effective with distance learning. The second purpose of the research was to determine if teachers' demographics impact the teaching strategies they use. The third purpose of the research was to determine if there was any change in teaching strategies used in response to the Covid-19 pandemic; for example, if the change to distance learning etc. impacted strategies and what kind of effect the pandemic has had on classrooms.

Conceptual Framework

Different Fields of Study Use Different Instructional Strategies

Shulman (2005b) stated that signature pedagogies are the principles of teaching for future professionals. Shulman indicated three critical aspects of teaching: how to think, how to perform, and how to act with integrity. Signature pedagogies shape the future character and practice of each profession. Shulman (2005b) stated that signature pedagogies are vital because they become pervasive in a content area. Signature pedagogies impart what is important, how knowledge is imparted, and how understanding is criticized, accepted, and analyzed.

Shulman (2005b) stated that a signature pedagogy has three dimensions: "surface structure," "deep structure," and "implicit structure" (p. 55). The surface structure consists of tangible and observable methods of demonstrating and implementing curricula. The "deep structure" refers to assuming the best way to impart knowledge of the content area. The "implicit structure" consists of the integrity and belief about "professional attitudes, values, and dispositions (p. 55). Shulman (2005b) stated that choice and elimination of strategies is a component of a signature strategy. Signature pedagogies evolve from student outcomes and describing the signature pedagogies can explain why those particular strategies are used in the classroom. Complex instructional practices can be simplified by signature pedagogies because they can be internalized and used to examine the subject area.

Signature pedagogies often reflect how a practitioner learned the practice (Shulman, 2005c). Technological advances in the educational practice field and changes in the organization are potent methods of changing classroom instructional strategies. Student outcomes and performance in the area they are practicing is another component of a signature strategy. Signature strategies create an environment of uncertainty and stimulate critical thinking

(Shulman, 2005a). Shulman (2005b) argued that a signature pedagogy must give equal balance to all three structures.

Research has identified the signature pedagogy in several different fields of study. Two important books discuss commonly identified signature pedagogies: *Exploring signature pedagogies: Approaches to teaching disciplinary habits of mind* (Gurung et al., 2009) and *Exploring more signature pedagogies: Approaches to teaching disciplinary habits of mind* (Chick et al., 2012). In these books, each chapter focuses on a specific discipline and identifies and discusses teaching strategies and signature pedagogies used in that discipline, covering a range of academic subjects taught in high schools and colleges. Signature strategies have been identified for a variety of disciplines in the humanities, fine arts, social sciences, natural sciences and mathematics, and professional training, but thus far, studies have not focused on identifying a signature pedagogy for CTE.

Much can be learned to improve teaching and learning by examining the signature pedagogies of several professional programs (Shulman, 2005a). The comparison of signature pedagogies may lead to improved classroom instructional strategies. Classroom instruction strategies have an innate inertia; teachers become accustomed to using certain instructional strategies and may be resistant to change. Changes in the condition of the teaching profession, new technologies, and critical examination of teaching are three conditions that can change the signature pedagogies used in different subject areas (Shulman, 2005a). Shulman (2005b) stated that “signature pedagogies make a difference. They form habits of the mind, habits of the heart, and habits of the hand.” Signature pedagogies impact “how professionals behave” (p. 59). Hargraves and Fullan (2012) indicated that more research is needed concerning “how” and which” signature pedagogies could increase teachers’ ability to teach. A review of the current

literature has revealed little research in determining a signature pedagogy or creating and implementing a signature pedagogy for CTE.

Statement of the Research Questions and Null Hypotheses

The following research questions and null hypotheses will be presented for this study:

Research Question 1. What are the potential signature pedagogies used by CTE teachers in their programs?

Research Question 2. To what extent do specific demographics impact a CTE teacher's signature pedagogy?

Research Question 3. Has Covid-19 had any effect on a CTE teacher's use of classroom strategies?

The null hypothesis is that the means of all samples will be equal

H_0: $\mu_1 = \mu_2 = \mu_{3\ldots} = \mu_k$

The alternative hypothesis is that a significant difference exists between the means of at least two population groups

H_A: $\mu_1 \neq \mu_2$ and/or $\mu_1 \neq \mu_2$ and/or $\mu_2 \neq \mu_3$ …. $\mu_1 \neq \mu_k$

Significance of the Study

Determining what classroom strategies are currently being used in different areas of CTE and discovering the teachers' reasons for using those will assist in developing signature strategies for specific areas in CTE. Shulman (2005a) stated that a teacher's choices of classroom strategy places importance on that strategy and the learning results of the strategy. Developing a signature strategy could improve the classroom learning experience for students, which will improve student outcomes. Falk (2006) stated that developing a signature pedagogy involves

identifying the “best practices” used in teacher education and then understanding them deeper (p. 11).

In addition, developing a signature strategy will improve programs to prepare teachers for those classrooms by providing empirical evidence on what strategies are most effective for each area of study and why they are most effective (Falk, 2006). Therefore, developing the signature strategy in CTE could improve instructional practices in the CTE classroom across the United States and therefore improve student outcomes. Through the development process of a signature strategy for CTE, the most used and the most effective strategies could be determined. As a result, a signature pedagogy would allow teacher preparatory programs to provide instruction on empirically based effective instructional strategies (Shulman, 2005a). Developing a signature strategy could improve student post-secondary outcomes.

Definitions

The following terms are defined for this study**.**

Area career centers: education centers that teach CTE courses to students from neighboring school districts located near each other, including vocational-technical centers, vo-tech schools, career centers, career and technology centers, and shared-time centers.

Career and Technical Education (CTE): as defined by the Association for Career and Technical Education (ACTE, 2006), classes that provide “students of all ages with academic and technical skills, knowledge and training necessary to succeed in future careers and become lifelong learners” (p. 1). Subject areas are agriculture education, business, marketing, and information technology education, engineering and technology education (industrial technology, technology education, PLTW©, industrial arts, UnderstandingbyDesign), family consumer sciences & human services education, and skilled technical sciences**.**

Earned degree: a post-secondary degree earned through completing specific requirements for graduation.

Alternative certification methods: a pathway to teacher certification where an individual with a bachelor's degree in a content area returns to a college of education for a program of study that may enable him/her to take courses while teaching; after the teacher completes coursework and passes a designated assessment test, the college recommends the individual, and the individual receives an initial teaching certificate (DESE, 2020).

Association of Career and Technical Education (ACTE): a membership organization representing thousands of career and technical education professionals with the mission of "providing educational leadership in developing a competitive workforce" with the goal of ensuring that all students are ready for a successful career (ACTE, 2020, p. 1).

Career and Technical Teacher Educator Program (CTTE): a teacher certification route for trade, industrial, and health science instructors.

Career Education Certification method (CEC): may include teacher certification programs that provides candidates with a temporary teaching certificate because of their related occupational experiences; candidates typically have a certain period to complete coursework to obtain a regular teaching certificate. (MO DESE, 2020).

Covid-19: a new respiratory illness that is spread person to person and is caused by a novel coronavirus not seen in humans before late 2019 (Center for Disease Control, 2020).

Council of Career and Technical Administrators (CCTA): a membership organization consisting of area career center, comprehensive high school, and higher education administrators from each state.

Four-year university with the student teaching method: a teacher certification method that requires a four-year degree program and includes a student teaching experience.

P-20 education: "the seamless development of all learners, prenatal through adulthood" (Michigan Department of Education, 2020).

Secondary grade level: grade level 9 through 12, as specified by the U. S. Department of Education and state Education Departments.

Signature pedagogy: "the types of teaching that organize the fundamental ways in which future practitioners are educated for their new professions" (Shulman, 2005b, p. 52).

Southern Regional Education Board (SREB): a membership organization consisting of sixteen states (Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia), which provides professional development curricula and proven practices (SREB, 2020)

The Strengthening Career and Technical Education for the 21st Century Act (Perkins V) (2018): a federal law passed in 2018 that reauthorized funding for CTE education in the United States, provided new definitions of completers, and allowed states to create their own plan for distributing funding.

Teacher Preparation Program (TPP): higher education programs of study "where prospective teachers gain a foundation of knowledge about pedagogy and subject matter" and classroom experiences (Feuer et al., 2013, p.1)

Summary

CTE coursework is an integral part of the high school curriculum in the United States. CTE coursework increased the percentage of students who graduate high school. Students who

complete CTE coursework have increased wages after graduating high school. Shulman stated (2005a) that determining a signature pedagogy for a subject area will increase teachers' effectiveness in the subject area. Shulman also stated that determining a signature pedagogy will also affect how teacher preparatory courses are taught in the subject area. This research will attempt to investigate and determine signature pedagogies for CTE and if Covid-19 has influenced classroom instructional strategies.

Since CTE coursework is an integral part of the high school curriculum in the United States, CTE teachers must stay current with the most effective classroom instructional practices to provide their students with workforce and post-secondary opportunities (Cannon et al., 2013). CTE programs provide many benefits to students, including increasing graduation rates, ensuring better preparation to enter the workforce or pursue additional training, improving self-esteem, and reducing gender stereotypes in professions. In addition, high quality CTE programs help to prevent skills shortages in certain industries and support overall economic growth. Because of the importance of CTE programs, it is important to understand signature pedagogies for each CTE subject area to increase teachers' effectiveness in the subject area and improve student outcomes.

Chapter II: Literature Review

Early Education

Early education was very primitive. Scott and Wircenski (2014) proposed that early learning happened through trial and error, accident, and eventually through apprenticeship. McGrath (1913) stated that through the study of man's symbols, we could determine that different roles were assigned to men and women. The various roles created family units, which then specialized in the division of labor. The division of labor eventually developed the caste system. Trades were taught by father to son by imitation and without any form of apprenticeship. The apprenticeship system evolved through this parent-child relationship (Scott & Wircenski, 2014). Roberts (1971) stated that the first recorded form of apprenticeship dates to 2100 B.C. when King Hammurabi decreed that a craftsman may adopt a son if he teaches him a trade, but if the craftsman fails to teach the son, he may return to his original father. Agricultural planting and harvesting with tools date back to the fourth millennium BC in the Middle East (Roberts, 1971).

The concept of the spiritual world created a need for harmonious existence. This spiritual concept created roles for priests, shamans, wizards, or medicine men. McGrath (1913) stated that when the priesthood stories became extensive, the first writing was invented, and the priests became teachers. Pre-Islamic education was primitive, unorganized, and met the needs of the youth. Young men were trained in horsemanship and war exercises. Instruction methods were based on mimicking, play, trial and error, and tribal songs. McGrath (1913) stated the training of children was instinctive. After Mahomet, schools were created to maintain the faith and increase intellectual gains. Asian educational models follow similar patterns to Islamic education patterns.

Hodge (1919) stated that aborigines of North American learned not only hunting and fishing, but also the artwork, customs, and etiquette. Eskimos taught their children skills by

giving them a difficult problem to solve and showing them how to solve them. Apache boys had fathers and grandfathers as role models to learn from. Bancroft (1882) stated that Aztec boys at the age of 15 were sent off to be priests or train for the military.

The early Egyptian society was divided into two castes (McGrath, 1913). The priests and military belonged to one caste: farmers, merchants, and laborers in another caste. The craftsmen formed guilds, which learned their craft from imitation. An Egyptian boy, after learning how to read, write, and discern, would become an apprentice as a commercial scribe. The earliest known Egyptian physician was I-em-Hetep in the mid-fifth century BC. King Athothis wrote the first known anatomy book. Physicians were instructed through apprenticeships, which were the primary means of instruction (McGrath, 1913). Temples and magistrates formed "bands of craftsmen" (p. 28), where people learned the crafts required for each position. Schools were created for architects and sculptors, who were highly regarded. Skills for these positions were often acquired through an apprenticeship. History shows that Egypt developed a practical system of education that consisted of trade, commercial, professional, martial, and priestly training. During this time, an Egyptian calendar was created and the Egyptian alphabet was developed from hieroglyphics. In the Bronze Age, tools and implements were created for agriculture, and weapons were created for war from smelting copper and bronze (Roberts, 1971).

Bronze and iron tools and weapons were a factor in Greece becoming a world power (Roberts, 1971). At the highest point in their civilization, Greece valued education that was primarily practical (McGrath, 1913). Athens promoted higher arts and professionalism. Early Greek society consisted of aristocracies, the middle class, and slaves. Apprenticeships and actual work were the main methods of instruction. Practicality conflicted with culture as a theory of education was created that emphasized choosing a vocation and training for it. The conflict

existed between learning for mental development and learning to provide utility for the upper class. McGrath referred to the cult of Aesculapius as the “first origin of schools of medicine” (1913). An individual physician could apprentice himself with an established physician before beginning to practice medicine. Other professions used the apprenticeship model in training, such as sculpture, dancing, and crafts. Parents who did not teach their children a trade could be prosecuted by a council. Sometimes extended family members would teach a nephew or grandson a trade that would provide earnings to help support the family. McGrath (1913) criticized Greek education for not being democratic; the highest form of education was preparation for public life.

Roman education was practical, with preparation for a vocation being the main objective (McGrath, 1913). Roman education consisted of three levels: elementary, secondary, and higher (Roberts, 1971). Liberal arts education gave way to training for farming, warrior, and public life. The father was the leader of the family unit and determined the outcome of his son’s career. Teaching by doing and apprenticeships were the main forms of instruction. Daughters learned weaving and sewing from their mothers while the boys learned farming, horse riding, and fighting strategies. Arithmetic was taught at an early age (Clarke, 1971). The abacus and finger symbols for numbers were taught to students. Children begin using grammar lessons, phonetic lessons, and writing lessons. Gwynn (1926) shows how the Roman government interfered with the educational system. Cicero closed schools down who were teaching Latin rhetoric in 92 BC to keep public order. Roman education also pursued medicine, architecture, and law. Johnson (1980) indicated that the importance of career and technical education was the buffering between liberal arts and technical skills. McGrath (1913) stated that no evidence exists for specialized

Roman schools. McGrath hypothesized that architects and engineers passed on their specialization through practical apprenticeships.

Education before the nineteenth century was practical, replicable, and vocational. Education existed to educate for religious purposes (McGrath, 1913). McGrath indicated that parish, monastic, or cathedral schools were vocational in nature. Christianity kept the position of craftsmen and the practice of apprenticeships alive through the Middle Ages (Adams, 1896). Monks were required to do manual labor seven hours per day and learned craftsmanship from more skilled monks (Barlow, 1967). Anderson (n.d) stated that education during the Middle Ages was strictly vocational through training of the knight. Knights were educated while serving as pages from seven to 14 years old and then as squires from 14 to 21 years old. Obedience to the king was first taught, then training in the art of war. Anderson (n.d) indicated that schools were formed for the training of knights.

Guilds grew as cities and towns grew in population. Guilds established regulations for governing apprenticeships, which included how they would be administered, and set standards for the finished goods (Scott & Wircenski, 2014). Regulations for the early guilds included (a) not enticing another master's apprentice, (b) agreements in writing between master and apprentice, (c) seven years as the minimum term of service, (d) only qualified masters could take on an apprentice, (e) masters must approve the apprentice at the end of the term of service before the apprentice could practice the craft, and (f) a master could have no more than three apprentices at one time (Roberts, 1971). Guilds of students were formed to protest monastic education (McGrath, 1913). These guilds studied secular knowledge, which consisted of law, medicine, and philosophy. An increase in secular training mirrored the growth of industry and commerce. Merchant and craft guild schools grew in popularity as elementary school and a

higher level of education. Leach (1896) discussed the importance of everyone learning Latin, even craftsmen. An apprenticeship with a trained professional was required after the university training. An apprenticeship system (Leach, 1896) regulated by the guild required seven years of study and developed a high standard of workmanship in the apprentice.

American Education in the 1800s

Career and technical education in the United States is rooted in colonists' apprenticeship programs that were a system of teaching trades (Gordon & Shultz, 2008). The power age began in the 1800s, which required that parts be made to create the machines. America had no standardized form of education and no legislation governing teaching practices (McCaslin & Parks, 2002). The invention of capitalistic and industrialist production created the need for productive workers (McGrath, 1913). The main purpose of apprenticeships in American history was to prepare the workforce for factory and agricultural jobs through hands-on instruction. Technical inventions such as the railroad, steam engine, and cotton gin were going to require new skills. Academic instruction was not embedded in the vocational apprenticeship programs. The first public schools for white students began in 1821. White, American Indians, and immigrant children were valued as laborers over students (Rudy, 1965).

Before 1850, Black children began attending segregated schools in Massachusetts (Alexander & Alexander, 2004). The court system upheld the segregation in *Roberts v. City of Boston* (1849) when it decided Sarah Robert must pass five white elementary schools to attend Smith Grammar School, which was in poor condition. At the beginning of the Civil War, four million Blacks were without a school and 90% of them were illiterate (Good, 1962). The growing economy presented economic, social, and education issues. Pressure grew to create a national education system. Private and public secondary schools served 6.7% of the age group,

and only 1.5% of college-age students had attended public secondary schools (Church & Sedlack, 1976). The requirement that students conjugate Greek and Latin verbs for six years became antiquated (Woodward C. M., 1887). The dropout rate of students was high, students did not learn any special skills, and few went on to college. Political and policy leaders realized that vocational education could become a way to address societal issues, economic issues, and a workforce without skills (Woods & Kennedy, 1922). The concept of vocational education embedded in secondary education grew. In 1862 the Morrell Act provided land grants to universities, which began providing CTE training for individual occupations (Gordon & Schultz, 2008).

As the economic depression between 1893 and 1895 caused socioeconomic problems, industrial processes became more complicated (Woods & Kennedy, 1922). The youth of ages 12 to 16 left school to enter a workforce for which they had few skills. During this time, the apprenticeship system had fallen into disarray and was not a viable part of the education and training system (Seybolt, 1917; Douglass, 1952). Productive workers during the late 1890s would require knowledge of mathematics, safety, and hygiene, and would need to be able to follow complicated instructions (Wirth, 1980). By the late 1800s, little improvements had been made to the educational systems as white people thought that Black students should pay for their own schools. Between 1900 and 1910, many Blacks moved north, but often found the same inequality of treatment that they endured in the South (Wirth, 1980). A great divide in education still existed in 1920. Only 9,526 Black students were enrolled in public schools, compared to 27,631 white students who were enrolled in public schools. In 1930, the divide became greater as only 9,868 Black students compared to 118, 897 white students were enrolled in public high school (U.S. Bureau of Education, 1923; U.S. Office of Education, 1932). The first high school

for Blacks was opened in 1917, according to Harlan (1972). High schools for Blacks were expanded after 1920 in urban areas. Thousands of rural youths did not have public schools to attend (Favrot, 1929). Booker T. Washington believed that minority groups tended to perceive CTE training as inferior to academic education and the African American middle class viewed CTE as something for someone else's children. Washington believed the route to financial success for African Americans was through the attainment of vocational skills (Gordon & Schultz, 2008).

Career and Technical Education in the United States

The Status of American CTE

By 2030, between 3 and 14% of the global workforce will need to be able to perform a completely different job function than they did in 2016 (Manyika et al., 2016). With up to 44% of all jobs becoming automated by 2030, workers will need to adapt (Taylor, 2019). CTE project-based learning creates an adaptive learning environment that engages the student in authentic problems (Blumenfeld et al., 1991). Southern Regional Education Board (SREB, 2020) professional development teaches teachers how to implement this strategy. Kubik (2015) stated that a "good project-based learning experience connects significant content standards to a problem that students find authentic, and it allows them to do relevant work on that problem while learning those standards"(p. 22), and Blumenfeld et al. (1991) stated that project-based learning increases student engagement through solving real-world problems. Today's students will need to problem-solve using critical thinking and innovative thinking skills. Project-based learning and other innovative teaching methods will allow students to create and innovate their own solutions to their project and apply it to real-world situations, which will create more successful students (Blumenfeld et al., 1991). Innovative curriculum, alternative pathways to

graduation, early graduation, and dual credit/advanced placement classes allow students to seamlessly transition to college (Kubik, 2015).

Today's students are expected to adapt, learn, think critically, and problem-solve. Loveless (2020) stated that critical thinking is important. Critical thinking is an essential life skill (Heinrich et al., 2015; Nirmala & Kumar, 2018). Critical thinking involves understanding "the logical connections between ideas" (Loveless, 2020, p. 1). To successfully teach critical thinking skills, critical thinking skills need to be practiced daily (Sherblom, 2010). When teachers spend too much time having students memorize facts and not conceptualizing them, this inhibits students' development of critical thinking skills (Sherblom, 2010). Students who have real-world experiences in high school have an easier transition to college (Loveless, 2020). Loveless (2020) suggested that teachers change the structure of their courses to implement more hands-on activities to implement critical thinking skill development. Critical thinking teaching strategies should be incorporated at all levels of the curriculum in the P-20 spectrum.

Collaboration at all levels of education is important for students to be successful in their careers. Abernathy and Payne (2017) stated that only 44% of Missouri's business leaders are satisfied with the supply of skilled workers, and only 15% think that high schools are adequately preparing students for the workforce. Some organizations offer readiness workshops that help college graduates get and keep jobs (Lynch, 2016). According to Lynch (2016), in 2014, only 29% of students who enrolled in two-year programs completed them, and 56% of students who enrolled in college graduate within six years. Academics and the workforce must collaborate to close this gap. Pathways for all minorities, genders, and nationalities must be created to allow all students to have the ability to provide for themselves (Partelow et al., 2018).

Creating initiatives and collaboration that bring leaders and teachers together to formulate strategies for workforce development should be a priority. Innovations must come through partnerships between public and private sectors, businesses and schools, universities, and colleges (Partelow et al., 2018). Initiatives such as the Kentucky Work Ready Skills Initiative (KWRSI), providing $100 million for workforce development, can fund innovation in P-20 curriculum development (Kentucky Education and Workforce Development Cabinet [KEWDC], 2018). KWSRI provided $100 million in state funds and $150 million in locally provided funds to train students for high-demand career fields. According to KEWDC (2018), Kentucky has implemented the Tech Ready Apprentices for Careers in Kentucky (TRACK) program, which places students into registered apprenticeship programs and gives students an opportunity to earn industry-recognized credentials while earning school credits. Initiatives like TRACK create opportunities for students to transition from public school to the workforce. Opportunities such as Murray State University's (*Murray Ledger & Times*, 2019) Teaching and Technology Summit provides two days of "collaboration and innovation" between educators and Murray State University's Teacher Quality Institute; events such as this should be expanded. Students enrolled in Lee's Summit R-7 School District's Summit Technology Academy can receive a bachelor's degree in a high-demand, high-paying field from the University of Central Missouri within two years of graduating high school (*Engineering News-Record Midwest,* 2018). *Engineering News-Record* (2018) stated that this program was created through a collaborative effort between the high school and the college, the community, and all the stakeholders. Futrell (2010) stated that future educators will have the responsibility for creating more "interactive learning environments" (p. 1). Those future educators are our educators of today.

Definition of Career and Technical Education

The Strengthening Career and Technical Education for the 21st Century Act (Perkins V, 2018) defined CTE as organized activities that offer courses that provide students with a combination of academic and practical skills to prepare them for a high-demand job. Perkins V added that the students targeted might be in elementary school, middle school, secondary school, or post-secondary school, and that the courses taught may result in students receiving technical skills or an industry-recognized credential. CTE is operationally defined as "a career-based curriculum that focuses on technical skills and expertise to prepares students to enter directly into the workforce with industry-recognized credentials or to successfully pursue post-secondary education" (College and Career Readiness, 2013; American Institutes for Research, 2020).

CTE is an educational curriculum that assists students in preparing to enter the workforce or post-secondary education (California CTE Standards and Framework Advisory Group, 2006; Levesque et al., 2008). Stauffer (2019) stated that CTE is the practice of teaching specific career skills to students in middle school, high school, and post-secondary institutions. Career and technical education, formerly known as vocational education, is comprised of vocational and technical high schools, comprehensive high schools, area career centers, community colleges, and four-year colleges and universities. Career and technical education are commonly known as vocational education. The Carl D. Perkins Vocational Education Act (Perkins I, 1984) defined vocational education as organized educational programs offering a sequence of courses designed for the purpose of preparing individuals for paid or unpaid employment in current or emerging occupations requiring other than a baccalaureate or advanced degree.

CTE courses include learning industry knowledge, applying the knowledge, solving problems, and "occupationally specific skills" to become a productive member of society (Perkins I, 1984, p. 2). The Association for Career and Technical Education (ACTE, 2011) defined CTE as an education that prepares adults and youth for a wide range of careers. These careers maximize the individuals "working potential" (para. 1) and may require a range of education from high school diploma to a four-year university. Career and technical education are offered in middle schools, high schools, community and technical colleges, and other post-secondary institutions. ACTE (2011) stated that CTE involves a variety of challenging fields in diverse subject areas, which include agriculture (farmers, animal scientists, turfgrass specialists); trade and industrial (automotive technicians, carpenters, electricians); business and marketing (entrepreneurs, financial officers, arts/graphics designers); family and consumer sciences (management and life skills, executive chefs, hotel managers); health occupations (nurses, physical therapists, biomedical engineers); public safety and security (EMTs, emergency management and response coordinators); and technology (3D animator, computer engineers, biotechnical engineer) (p. 1).

Importance of CTE

In 2016, a survey found that 54% of American companies report having openings for which they cannot find qualified workers (Pew Research Center, 2016). Monthey et al. (2016) stated that our education system is clearly not keeping up with the skills demands of our knowledge-based economy. The value of CTE in positioning CTE graduates for success in the global economy. CTE programs provide an authentic and rigorous opportunity for students to prepare for the competitive world economy. Monthey et al. (2016) further stated that CTE offers engaging, motivating, and relevant educational experiences that merge with academic standards.

Courses that integrate academics with CTE will make the subject matter relevant and help students apply skills acquired in the workplace setting (StGean, 2010). Scott and Wircenski (2014) indicated that CTE learning occurs through teaching workforce principals and basic concepts of occupational situations. Pierce and Hernandez (2015) conducted research on high school students using an experimental and a control group. The research determined that reading scores of the students taking CTE coursework were higher than the reading scores of students without CTE coursework. Dagget (2005) found that CTE elective courses provided a curriculum that reinforced reading, mathematics, and science skills.

CTE coursework prepares students not only for the workforce but also for higher education. Career and technical high schools address industry employment needs, such as manufacturing and healthcare, by closing a skills gap in trades and technologies and preparing students to pursue higher education (Castellano et al., 2003). Thomas (2004) stated that high-stakes testing would pressure CTE teachers to devote more time to academic skills and less towards teaching specific technical skills. CTE teachers must continue to show how CTE coursework promotes academic success (Daggett, 2009). Scott and Wircenski (2014) stated that the final goal of CTE is to ensure that high school graduates who want to enter the workforce are properly prepared.

The benefits of completing high school range from getting employment benefits to enjoying a higher standard of living. Schargel and Smink (2014) stated that achieving a high school diploma increased employment opportunities and increased the opportunities for students to attend higher education. High school graduates have better health, longer lifespan, and are incarcerated less than students who drop out of high school (Rumberger, 2010). Research has determined that CTE coursework has reduced the percentage of students dropping out of high

school (Wonacott, 2002). A study of international students demonstrated the association with CTE coursework and reduced high school dropout rates (Bishop & Mane, 2004).

High school students graduating on time is important. Phelps and Chan (2016) found a correlation between high school students' knowledge of career paths and student success and proposed that CTE coursework provided students with a higher level of knowledge of possible careers. High school students who complete high school within four years are more likely to earn a higher income, graduate from a college or university, and live healthier lives (Hull 2009). Students who do not graduate with their cohort on time are less likely to be employed or go onto higher education (Opportunity Nation, 2014). CTE coursework is designed to link classroom teaching to real-world experiences. CTE coursework emphasizes skill-building through critical thinking, logical reasoning, research and development, problem-solving, and collaboration (American Institutes for Research, 2020). This skill development is applicable in CTE and other coursework that increases student success rates (Gottfried et al., 2016).

Hands-on, project-based, and collaborative teaching styles increase student engagement with the curriculum (Bozick & Dalton, 2013; Gottfried et al., 2016). High school students taking CTE coursework have a higher probability of graduation and of being linked to career and college opportunities (Partnership for 21st Century Skills, 2010). The real-world connection through CTE increases engagement, which is often a determinant of dropout rates (Barison, 2014). CTE coursework affects high school completion as well as post-secondary education enrollment (Gottfried & Plasman, 2017). More jobs are requiring more technical skills and specialization learned through post-secondary enrollment (Brand et al., 2013). Gottfried et al. (2016) described CTE coursework as providing a sense of relevance for high school students (Bozick & Dalton, 2013; Stone & Lewis, 2012). In a quasi-experimental study of high school

students, Gottfried and Plasman (2017) determined that students completing a higher number of CTE courses were more likely to graduate on time and is less likely to graduate. Gottfried et al. (2016) stated the importance of encouraging CTE enrollment at all high school grade levels because CTE coursework has the potential to increase the percentage of high school graduates and post-secondary attendees.

Dewey's Effect on Education

John Dewey (1859–1952) was the founder of experimentalism philosophy and was a proponent of social change and educational reform (Buxton, 1984). He was an American philosopher, psychologist, and educational reformer who believed in experiential learning. Dewey was one of the most critical influences on modern educational theory (Wheeler, 2016). Dewey graduated from the University of Vermont, second in his class at the age of 19. Dewey later received his doctoral degree from Johns Hopkins University in 1884 and became an assistant professor at the University of Michigan. Dewey started an experimental elementary school in 1894 and cofounded The New School for Social Research in 1919 (Buxton, 1984). The New School for Social Research emphasized educational freedom in the social and art sciences.

Dewey's teaching philosophies were influenced by William James's writings (Buxton, 1984). Dewey's philosophy, which centered on human experiences, became known as experimentalism or instrumentalism. One of Dewey's premises was that all students should learn the basic skills needed to live in a world of science (Buxton, 1984). Dewey connected philosophy and education as having a "mission of education-for-living" (Hildebrand, 2018). Dewey (1938) used the scientific method of hypothesizing and creating to conclude that education was an ongoing process of events and layered experiences supported by making the current experiences as robust as possible.

Dewey's view of experiences included experimental, experience, and methodological for philosophy (Hildebrand, 2018). Experience entails the experimental character of learning. Dewey's experiences observing children involve acting and being acted upon (Dewey, 1931). Dewey (1931) stated that experience consisted of primary (direct experiences) and secondary (things that are known). Dewey's name for method included "experiential," "empirical," and "denotive" (p. 380–88). Examples of Dewey's active learning concepts are students experimenting, voting, playing music, reciting poetry, and doing math. Dewey saw recess as an incubator of ideas, a place to learn team rules, and a place to organize one's thoughts. Dewey believed that students learned how to deal with difficult and complicated situations through experiential learning (Dewey, 1916/1966) and that high rigor or obstacles created "a difficulty in an indispensable stimulus to thinking, but not all call out thinking" (Dewey, 1916/1966, p. 184).

In his 1917 *Democracy and Education*, Dewey defined learning as "the name for the outcome of experience as experimental" (p. 146). Dewey (1916/1966) believed in cross teaching life experiences by connecting experiences from one subject matter to another subject matter. Dewey argued that experiences are "crucial ingredients in social and moral development" (Schiro, 2012, p. 174). A teacher doing, reflecting, and revising were practical applications of learning, which Dewey advocated. Dewey defined critical thinking as "active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it, and the further conclusions to which it tends" (Dewey, 1910/1998, p. 6).

Dewey believed in building society through the education of its students in several different subjects and that students should be doing woodworking, metalworking, weaving, sewing, and cooking, not as separate subjects but as hands-on learning. Dewey (1938) asserted that learning could be observed in real-life situations, not just in classrooms where students learn

by doing and using hands-on solutions to solve problems (Schiro, 2013). Dewey's (1916/1966) six tenants of education are: (1) An individual's interest in the subject should determine the subject studied; (2) Hands-on learning should be combined with the thinking; (3) "Good habits of thinking" (p. 192) produce learning habits which allow students to hypothesize, test, and rethink the connection between actions and consequences; (4) Cross subject matter learning is part of good teaching; (5) Development of the student as a member of society is an important subject matter; and (6) Intense motivation should be created by education.

Working in the occupation was how Dewey described the best method of training for an occupation. One of Dewey's goals was to ensure all citizens have the right to full participation in decision making, and industrial policy was best achieved through vocational education (Defalco, 2010). Shapiro and Gross (2013) stated that Dewey thought learning could be observed in classrooms where students learn by doing and using hands-on solutions to solve problems. Project-based and problem-based learning is attributed to Dewey's theories of learning (Dewey, 1916/1966). Wheeler (2016) stated that Dewey's theories of students engaging directly in their learning are essentially the same as what is today known as experiential learning.

Department of Education

The U.S. Department of Education has played an important role in the expansion of public education in the United States (U.S. Department of Education & National Center for Education Statistics, 2020). The Department of Education began operating at the cabinet level in the presidential administration in 1980. On March 2, 1867, the U.S. Department of Education was formed and on July 1, 1869, the Department had later renamed the Office of Education and placed under the Department of the Interior. Renamed the Bureau of Education on July 12, 1870, the Department of Education was still under the Department of Interior (U.S. Department of

Education, 2010). The Office of Education fell under the Federal Security Agency in 1930 and was moved under the Department of Health, Education, and Welfare on April 11, 1953 (Lykes, 1960). In 1980, the U.S Department of Education began with an annual budget of $15,000 and four employees. By the mid-2010, the U.S Department of Education had 4,300 employees and a budget of $60 billion (U.S. Department of Education, 2010).

As federal funding of public education increased in the 1960s, the role of the U.S Department of Education became more important. The U.S Department of Education administers and coordinates federal assistance and establishes policies for education (U.S Department of Education, 2010).The department is responsible for assisting the president in implementing educational policies and executing the laws Congress enacts. In 2020, the department had 4,400 employees and a $68 million dollar budget. The current U.S. Department of Education's mission statement is to promote student achievement and preparation for global competitiveness by fostering educational excellence and ensuring equal access (U.S. Department of Education & National Center for Education Statistics, 2020). Funding has increased and decreased for the Department of Education as the political battle of federal involvement in public and higher education has persisted for decades.

The federal distribution of federal education dollars to the states collects data on student achievement and creates educational policies that apply to all 50 states (U.S. Department of Education & National Center for Education Statistics, 2020). The U.S. Department of Education & National Center for Education Statistics (2020) indicated that the department oversees federal student grants, federal student loans, and federal student work programs. The U.S. Department of Education & National Center for Education Statistics (2020) indicated that there are three types of grants are overseen by the U.S. Department of Education: formula, discretionary, student.

These grants are based on application, need, and merit. The U.S Department of Education provides for and oversees low-cost student loans.

Legislation Affecting CTE

Lynch (2016) stated that by the last quarter of the nineteenth century, the foundation and basic principles of free public education in the United States had been set. Schools provided instruction in reading, writing, arithmetic, history, grammar, rhetoric, and geography, and the instructional method focused on memorization. The small one-room schoolhouse was quickly disappearing in urban areas but was still prevalent in rural areas. Early twentieth-century education consisted of eight years in elementary school and four years of high school. Lynch (2016) stated that in 1910, this model changed to six years of primary school, three years of middle school, and three years of high school. However, parents always had the option of not sending their children to school.

The Establishment Clause of the First Amendment prevents the government from showing a preference for religion over non-religion and non-religion over religion in all situations (U.S. Const. amend. I). *Plessey v. Ferguson* provided that "separate was equal for people of different color as long as they were equal and upheld racial segregation" (Woodward C. V, 1964). The Smith-Hughes Act (1917) established vocational education as part of the high school system and classified students as either academic or vocational. Smith (2019) stated that CTE students have historically faced segregation by being placed in CTE courses, putting them in low quality courses that would lead to low-income jobs.

Vocational Education Acts

As the economic workforce concerns grew, the United States Congress intervened to pass legislation to address the needs. At the turn of the twentieth century, there was a need for a

curriculum that met local needs. McGrath (1913) stated that The Massachusetts Investigation of 1906 found that most high school dropouts wanted to learn a trade. As education was changing at the turn of the twentieth century, McGrath (1913) stated that the goals of education were moving towards "preparation for complete living" and for "joyful work and joyful leisure" (p. 1). McGrath also proposed that education was evolving into vocational education. Snedden (1913) stated that vocational education was becoming irreplaceable because of societal needs. Additionally, Sneddon (1913) stated that introduction to vocational arts must be assumed by public schools, and that role of vocational education must grow and work together with commercial and academic training. Sneddon referenced the new (vocational education) to address society's social class restrictions and a way for each person to make himself able to contribute to society. Funding increased as a need to compete with other countries that were more successful with science and technology.

Morrill Act of 1862

President Abraham Lincoln signed legislation that Congress passed that increased funding as a need to compete with other countries that were more successful with science and technology. The U.S. House of Representatives issued a report that debated vocational education and determined it to be "a crying need," which would "prevent the waste of human labor" and "increase the wage-earning power" and "meet the demand for trained workmen" (Smith, 1914, p. 4). The Morrill Act (Library of Congress, 2020) provided for donating public land to the several states and territories which may provide colleges to teach agriculture and the practical arts (The Act of 1862). Vermont congressman Justin S. Morrill in 1862 sponsored the Morrill Act that created funding for educational purposes. Selling public lands to fund secondary and post-secondary institutions was implemented through the Morrill Act, but omitted states that had

seceded from the Union. Educational institutions created through funding provided by the Morrill Act were considered land-grant colleges because their financial support came from the sale of the land (1862). The second Morrill Act of 1890 eliminated race as a requirement for admission to the university. Cornell and sixty-eight other universities (Act of August 30, 1890) were beneficiaries of the second Morrill Act of 1890. Of the 69 universities benefiting from the second Morrill Act of 1890, 18 black land-grant universities received land grants.

Smith Hughes Act of 1917

The Smith-Hughes Act of 1917 was the first federal authorization of funding for vocational education. At the turn of the twentieth century, a standardized public-school curriculum did not exist, and 75% of the population lived and worked in rural areas. Venn (1970) stated that vocational training became less academic after 1900, even though vocational education was a practical and useful education for American youth. As the population almost doubled from increased from $76 million to over $92 million from 1900 to 1910, the gross national product more than doubled, and farm income drastically increased. Venn (1970) stated that industrial production almost doubled from 85% to 160%, and changes in economic and social demands created a need for skilled farm and factory workers and managers. Immigrants from Russia, Italy, and Northern Europe had filled the need for workers up to 1900, but few workers possessed the skills demanded by the changing economy (Venn, 1970).

In 1915, the Commission on National Aid to Vocational Education was created to answer six questions: (1) What is the need for vocational education? (2) Was there a need for federal grants (assuming a need for vocational education)? (3) What vocational programs required federal grants? (4) To what extent should the federal government extend federal grants for vocational education to the states? (5) What amount of money was needed (the proposed

legislation)? and 6) What standards are required for the federal government to grant monies to the states for vocational education? (Smith, 1914, p. 10). The following recommendations were reported by the Commission:

1. Funding support for college preparatory programs in public schools.

2. Federal aid designed to prepare students more than 14 years old for employment.

3. Support for three types of schools: full-time schools, with 50% of the time in vocational instruction; part-time schools for employed youth; and evening schools for adult workers.

4. Federal funding should be used for training for vocational teachers.

5. Grants should be available for paying part of the salaries of vocational teachers.

6. Funds should be available for vocational teachers to conduct research activities.

7. Schools receiving federal funds should work under public supervision.

8. Schools receiving federal funds should be less than college grade.

9. Some form of the administrative structure should be developed to supervise grants on a statewide basis.

10. Federal grants should be distributed under the discrepancies of a federal board.

The Commission's report led to the passing of the Smith-Hughes Act of 1917 and were the most important document in the history of vocational education (Howard & Gordon, 1999).

On February 23, 1917, President Woodrow Wilson signed the National Vocational Education Act of 1917 (Smith-Hughes Act) that provided funding for trade, agricultural, and industrial education. The Smith-Hughes Act (1917) was passed to promote vocational education in all states. The Smith-Hughes Act provided funding for federal agencies to collaborate with the states in the promotion of education in the trades, agriculture, and industries. The funds were also

to be used for the education of teachers of vocational subjects and to appropriate money and implement regulation on how the money was appropriated. In 1926, the allocation was increased by $4.2 million dollars from the initial allocation of $3 million dollars in 1917. Of this, $3 million dollars was earmarked for agriculture, home economics, and trade industry education, while $1 million was directed toward vocational education preparation for teachers. Agriculture education was prorated depending on the state's rural population, whereas the trades and home economics funding were prorated per the state's urban population (Smith-Hughes Act, 1917).

Laws Related to Vocational Education

Only ten laws were passed concerning vocational education between 1917 and 1947. Hawkins et al. (1966) stated the laws were as follows:

- Smith-Sears Vocational Rehabilitation Act (1918)—provided vocational training to WWI veterans upon returning from war
- Smith-Blackhead Act (1920)—provided civilian rehabilitation training for anyone injured in industry
- Smith-Hughes Act (1924)—allowed for the inclusion of Hawaii
- George-Reed Act (1929)—allocated $2.5 million for a period of five years to supplement the Smith-Hughes Act in the areas of home economics and agriculture
- George-Ellzey Act (1934)—provided additional funding for trade and industrial education
- George-Deen Act (1936)—allocated $12 million annually for agriculture, home economics, trade, and industrial education, and distributive education

- National Apprenticeship Act, also called the Fitzgerald Act (1937)—designed to train a competent workforce by providing the worker with instruction as a component of work; training was done at the expense of the employer
- National Defense Act (1940)—provided funds for vocational education for war production workers and encouraged rapid training of workers, primarily women who were trained for industrial work to support the war effort
- Walsh-Clark Act (1943)—provided vocational rehabilitation for WW II veteran
- GI Bill, Public Law 346 (1944)—provided college education or vocational training for veterans
- George-Barden Act (1946)— supplemented the Smith-Hughes Act by providing $28 million for agriculture, home economics, trade and industrial, and distributive education

Vocational education programming was broadened with additional funds that could be spent for industry required equipment and the employment of guidance counselors. The George-Ellzey Act and the George-Deen Act significantly increased funding for vocational education.

National Defense Education Act

The National Defense Education Act of 1958 (NDEA) was considered one of the most successful educational legislation initiatives (Senate Historical Office, n.d.). Americans felt a technological superiority to the Soviet Union until the Soviet Union launched Sputnik on October 4, 1957. The United States quickly found itself behind the Russians in a space race. A demand for more scientists and engineers overcame resistance to providing federal aid to public education (Senate Historical Office, n.d.).

President Eisenhower signed the NDEA on September 2, 1958, which provided funding for institutions and students (Swenson, 2000). Public and higher education in the United States was impacted greatly by the NDEA (Twight, 1996). NDEA provide low-cost student loans and increased funding for all colleges and universities (Senate Historical Office, n.d.). The legislation was passed to support vocational education (now termed career and technical education). NDEA established standards and schools for foreign languages to serve the national interest. Merit-based grants for gifted students to attend higher education were provided by NDEA. The number of college students doubled to 7.5 million in 1970, and NDEA was considered successful.

Prior to NDEA, public and higher education had few standards of foreign language instruction. During the Cold War (1945–91), Americans learned how little was known about their adversaries, such as the Soviet Union, China, and other Middle Eastern and Asian countries (Swenson, 2000). Petricevic & Teece (2019) stated that after World War II, the world economy drew academic boundaries and sharing of information between universities slowed. The United States educational system placed emphasis on studying counties, especially studying Japan as a success story and China as a study of communism. Students studied key processes such as modernization and "political development" for the goal of spreading democracy (p. 8).

Vocational Education Act of 1963

The Vocational Education Act (VEA) of 1963 initiated three crucial initiatives that heavily impacted CTE in public education. These initiatives targeted the following areas: connections between work and academics, development of programs that help students in getting jobs, creating vocational education advisory boards, and granting of funds to build vocational facilities (Doolittle & Camp, 1999). Section 1 of the VEA provided funding for "building vocational schools and created a work-study curriculum for students." The 1963 VEA provided

federal grants to states to implement, extend, and improve existing programs of vocational education, and provided funds to implement and develop new programs of vocational education. Funding provided part-time employment for youths who need the earnings from such employment to continue their vocational training on a full-time basis. The 1963 VEA provided opportunities to high school students and adults to complete their education and become prepared to enter the labor market and for adults in the workforce to upgrade their skills or learn new skills. The VEA (sect. 1) provided individuals with disabilities access to high-quality vocational training or retraining. The training would be realistic of what the workforce would require for gainful employment according to everyone's interests, needs, and abilities to benefit from the training. The VEA required each state to create a State Board of Education that would be the governing body for administering and supervising the funds given by the federal government. Permanent funding was established for practical nurse training and area technical training programs. In 1968 an amendment was added that allowed funds to be used for post-secondary education. Title IX in 1974 increased the number of students who could participate in vocational education (U.S. Department of Education, Office of Civil Rights, 1997). Community college funding was added in 1972 and was reauthorized by Congress in 1976.

Perkins I

The Vocational Education Act of 1983 (Perkins I) was named after Carl Dewey Perkins (D-KY), who served in the House of Representatives from 1949 to 1984 (National Skills Coalition, 2013) and who introduced the Vocational Act of 1984 on October 19, 1984. Perkins I replaced the VEA of 1963 and provided funding for technical and academic skills necessary for technical education students to be successful. Perkins I addressed the growing need for technology embedded education and the retraining of the workforce (PCRN, 2020a). Perkins I

also required states to provide improved vocational education services and activities to increase the participation of: (1) handicapped individuals; (2) disadvantaged individuals; (3) adults who need training or retraining; (4) single working parents or homemakers; (5) participants in programs to eliminate sex bias and stereotyping in vocational education; and (6) criminal offenders who are serving in a correctional institution (Perkins I, 1984). Perkins I provided funding for states to develop high-quality vocational education that would increase economic development, meet the needs of the people, and provide underserved population groups access to quality vocational education. Perkins I (1984) provided funding to train youth and adults and to improve employment opportunities for employed or unemployed workers with new technological skills. The President's Committee on Employment of People with Disabilities (1988) stated that Perkins I increased student enrollment in CTE courses. Students with limited English proficiency and students with disabilities showed the largest percentage growth in participation of CTE coursework. Perkins I (1984) required states to create state boards of vocational education that were required to submit plans to the Federal Board of Vocational Education for review.

Congress's opinion that educational decisions were best left to local school districts was reflected in passage of the Vocational Act of 1985 (Scott & Wircenski, 2014). Senators Stafford, Pell, Hatch, Kennedy, Huddleston, Ford, Randolph, and Eagleton proposed Amendment 3661 on August 8, 1984, five days after Representative Carl D. Perkins died. The amendment changed the name of the act from The Vocational Act of 1985 to the Carl D. Perkins Vocational Educational Act of Act. The Carl D. Perkins Vocational Education Act went into effect July 1, 1985, after it was signed on October 19, 1984, by President Reagan (U.S. Senate, 1984).

Perkins II

The Carl D Perkins Vocational and Applied Technology Education Act of 1990 (Perkins II) reauthorized the funding from Perkins I with a few changes (Wirt, 1991). Perkins II required states to provide outcome-based systems for accountability of the federal funding the state receives (Stecher et al., 1994). The first change was to incorporate more academics into the vocational education curriculum. The most significant shift in vocational education policy was incorporating employment skills as well as academics (Hayward & Benson, 1993). The second change was to redirect the funds toward school districts with the highest percentage of poor people. The third change was increasing the services provided to special populations of students. Creating a system for accountability and the distinction between the funding for secondary and post-secondary levels of vocational education was the fourth change.

Perkins III

On October 31, 1988, the Carl D. Perkins Vocational and Technical Education Act (Perkins III) was signed into law by the 109th Congress. The purpose of the reauthorization of the original Perkins I Act was to provide a form of assessment to maximize the return on investment of the federal funds and determine how effective the states were in vocational and technical education. Perkins III implemented a budget of $1.3 billion that funded administration, curricular innovation, equipment purchases, career guidance services, and disadvantaged populations of students (Lakes, 2007). The National Assessment of Vocational Education was created under Perkins III as an evaluation system to reform secondary level vocational programs. Perkins III (1998) required states to collect data and calculate their results in a numerical form and to continually make annual progress towards improving CTE students' performance. The report to

the Committee on Labor and Human Resources of the Senate and the Committee on Education and the Workforce of the House of Representatives used these data.

Perkins IV

The Carl D. Perkins Career and Technical Education Act of 2006 (Perkins IV) was the principal source of funding for vocational education in the United States. Perkins IV defined CTE as organized educational activities that are offered through course sequences so that students can gain academic and technical knowledge that will prepare them for further education or a career in current or emerging employment sectors. Perkins IV reauthorized and amended Perkins III by providing increased emphasis on the academic achievement of CTE students. The purpose of Perkins IV was to enhance the career, academic, and technical skills of a secondary and post-secondary student in CTE courses (PCRN, 2020a). The U.S. Department of Education (2010) stated that Perkins IV further developed improved government accountability and the connections between secondary and post-secondary education. Perkins IV (2006) improved the quality of CTE teachers, administrators, and counselors. Additionally, Perkins IV provided the students with opportunities to become lifelong learners by developing skills and knowledge that would transfer to the workforce. Over $1 billion dollars was allocated by Perkins IV (2006) toward career and technical education programs. The funds authorized were distributed to area career centers, high schools, community colleges, and four-year universities that offered CTE courses under Perkins IV.

Perkins IV became the primary source of funding from the federal government to the states (PCRN, 2020a). The emphasis on academics, career, and technical education through career and technical education was renewed through Perkins IV (PCRN, 2020b). Perkins IV provided for assessing the impact of CTE programs on student outcomes and included requiring

states to report student performance data based on their gender, race, special population categories, and ethnicity. Data involving students with Individual Education Plans or English as a Second Language students were required to be reported by Perkins IV (2006).

School districts had previously aligned curricula with the student's interests and cognitive abilities (Aliaga et al., 2014). White "academic" students were enrolled in college preparatory classes, while poor and minority students were placed in vocational education classes. Vocational education classes separated students into a segregated "dumping ground" for students deemed to be "nonacademic" instead of being viewed as an opportunity to become successful (Aliaga et al., 2014, p. 4). Before Perkins IV, a consistent database for CTE students' credits did not exist. Some states reported their students' CTE credits, while other states did not. Also, a standard for all states to determine the requirements to be a CTE student did not exist. Because of the inconsistent reporting, Perkins IV (2006) required states to identify student coursework completed in the 16 career clusters, even if a state does not offer all 16. Perkins IV defined a "concentrator as a student who completed three units of CTE coursework in a specific occupational pathway" (2006, p. 1).

Perkins IV (2006) extended into the workforce and beyond the classroom. The importance of career counseling to ensure that students enroll in courses that will assist them in their career interests was reestablished by Perkins IV. Cooperative education guidelines and the role of career and technical student organizations (CTSOs) were firmly established by Perkins IV. Perkins IV provided students with information about financial aid, careers, and the impact of education on student's career outcomes. Perkins IV (2006) required teachers to develop a curriculum that meets students' future employment needs and established funding for teacher professional development (Threeton, 2007).

Each state implemented Perkins IV differently. The U.S. Government Accountability Office (GAO reported that as of 2009, 29 states had adopted these recommendations at the post-secondary level and 34 states had adopted the recommended use of industry-recognized credentials assessments at the secondary level (2009). The GAO (2009) reported that the Perkins IV requirement to implement industry-recognized credentials would be expensive and that it would be difficult to report students' achievement data. Policies were enforced through onsite and off-site reporting inspections, and support was provided to states through analyzing data and researching different approaches to technical skill assessments. Fully implementing Perkins IV required assistance from the federal government.

Perkins V

On July 23, 2018, The Strengthening Career and Technical Education for the 21st Century Act (Perkins V) was signed into law on July 31, 2018. Both the House of Representatives and the Senate unanimously passed bills which authorized $1.2 billion annually towards CTE (Ferguson, 2018). A significant shift in American sentiment towards education was signaled by the enacting of Perkins V. A *Phi Delta Kappan* poll showed that 82% of Americans supported teaching career readiness and job skills in public education even if it meant less time in core classes (Ferguson, 2018).

Perkins V provided an expansion of every student's ability to choose, explore, and follow a career and technical education program of study (PCRN, 2020b). Perkins V (Office of Career, Technical, and Adult Education, 2018) allowed the school district to use federal funds for all students, including middle school students. One of Perkins V's (2018) purposes was to provide lifelong learning opportunities by providing educational and training programs for all students. A second purpose was to increase the academic rigor of the CTE curriculum and further develop

secondary and post-secondary connections. A third purpose was to give states and local school districts more flexibility to determine how they develop, design, and implement CTE. Perkins V redefined “special populations” to include foster youth, homeless individuals, older foster adults, and children of active-duty adults (Office of Career, Technical, and Adult Education, 2018). The Office of Career, Technical, and Adult Education (2018) reported than an increase in funding for school districts with a high number of concentrators, rural areas, and schools that are underperforming was provided for by Perkins V.

Perkins V made some changes to CTE while leaving most of Perkins IV intact (Advance CTE & ACTE, 2018). Decentralization of the CTE decision-making was one change caused by Perkins V. The requirement of the states to get the Secretary of Education’s approval to eliminate any requirements mandated by the 2015 Every Student Succeeds Act (ESSA) was removed by Perkins V (Ferguson, 2018). Under Perkins V (2018), each state is now required to create individual plans for CTE implementation. The requirement that the lesser of 0.1% or $50,000 be allotted for recruiting special populations to enroll in CTE programs is another change under Perkins V. The amounts allowable for the reserve fund was increased from 10% to 15%, and the amount set aside for educating individuals in prison or juvenile facilities was increased from 1% to 2%. Indian tribes, tribal organizations, and tribal educational agencies at secondary and post-secondary levels were added to become eligible recipients. Perkins V (2018) increased the emphasis on the high demand career field, and the number of occupational fields required to be offered to receive funding was reduced from five to three.

Perkins V (2018) redefined CTE as “organized educational activities” that provide courses with “coherent and rigorous content aligned with challenging academic standards (sec. 3). Two new population groups—homeless students and youth with parents in the military—

were created by Perkins V (Advance CTE & ACTE, 2018). Perkins V (2018) added grade levels that funding could be used for to now include as young as fifth-grade programs and changed the definition of a concentrator to a student completing at least two CTE courses from the same program.

Perkins V (2018) provided specific guidelines for funding all state plans. Each state's plan must include an explanation of how CTE programs align with the state's workforce development activities, detailed descriptions of how the state's CTE programs will be created and implemented, and the states' vision statement and goals for educating its workforce. One year was given for each to the state to create their own plan and submit it for approval. Perkins V (2018) redefined concentrators as a high school student who completes at least 2 CTE courses in a program of study. Perkins V (2018) increased support for work-based learning, defined as students interacting with community or industry professionals in workplace settings where students learn tasks required for a career that parallels the instruction and curriculum.

Guidelines for local agencies to receive funding were provided by Perkins V (2018). To receive funding, each local comprehensive high school, area career center, and higher education institute must complete a comprehensive needs assessment and the results must be provided every two years. The comprehensive needs assessment should address all parents, faculty, community, and student subgroups. The results should include components of the following: (1) sufficiency of the size of the program to meet the needs of the students; (2) student performance on indicators; (3) a plan for retaining and recruiting of CTE teachers; (4) progress toward implementing new programs: and (5) a plan to ensure access for all students to high-quality CTE courses. The local area needs assessment will determine which areas the funding will be required to spend.

Policy Effects

The $1.2 billion CTE funding was reallocated towards CTE by Perkins V (Perkins V, 2018). Carnevale et al. (2013) projected that 65% of all jobs would require some type of post-secondary training beyond high school. More than 25% of high school students take at least four CTE courses (Musu-Gillete et al., 2016). In 2017 and 2018, 46 states and the District of Columbia introduced more than 372 bills concerning CTE (Keily, 2019). Through increased legislative efforts, CTE advocates would support that CTE coursework may improve core academic skills and increase school engagement (Jacob, 2017). Some researchers have indicated that CTE provides students with work-ready skills and increases attendance (Brunner et al., 2019). By studying enrollment in an academy setting, Hemelt et al. determined that CTE coursework increased the rate of college enrollment of males and increased high school graduation rates by almost 8% (2019). Graduates' wages increased by 2% for every year of coursework completed after the completion of the first year (Kreisman & Stange, 2017). In Massachusetts, where students are required to take a CTE course, the high school graduation rates increased by 5% for high-income students and 7% for low-income students (Dougherty, 2018).

CTE can provide America with a competitive workforce by embedding creative math, literacy, and science skills in education that employers are requiring and improve the economy (ACTE, 2006). The renewed and increased funding for CTE has provided positive and economic benefits for students who earn a career-focused associate degree or vocational certificates (Stevens et al., 2019). Dougherty (2016) and Brunner et al. (2019) indicated that CTE coursework had positive impacts on students who were completing them. In investigating three cohorts of students, Dougherty (2016) determined that completing one additional CTE course

above the national average increased the graduation rate by 3.2%. Dougherty (2016) also determined that completing one CTE course above the national average increases a student's probability of being employed within the year of graduation by 1.5%. CTE concentrators were 20% more likely to graduate from high school and 1.3% more likely to pursue post-secondary education in a two-year college (Dougherty, 2016). ACTE (2018) indicated that CTE should focus on providing high-quality education and access for all students, and reinforced that states are the best entity to monitor and deliver CTE to students.

Signature Strategies in Education

Classroom instructional strategies are a result of an instructor's choice as to the comfort of the instructor, tasks the students need to complete, and the content area (Persky, 2014). Shulman (2005b) indicated that signature pedagogies consist of various teaching methods that determine how new teachers become "educated for their new professions." Signature pedagogy will determine how these practitioners determine the "fundamental dimensions of professional work—to think, to perform, and to act with integrity" (Shulman, 2005b, p. 52). Signature pedagogies also reveal the values, approaches, policies, and practices of an academic discipline (Shulman, 2005a, 2005b). Several disciplines have already identified their signature pedagogy. Signature pedagogies are "common pedagogical approaches across clusters of disciplines" (Windschitl et al., 2012). Signature pedagogies are "the characteristic forms of teaching and learning…that organize the fundamental ways in which future practitioners are educated for their new profession" (Shulman, 2005b, p. 52). West (2012) proposed that teachers' perpetual evaluation of practices is an important part of students' ability to understand, appreciate, and participate in the global economy.

Music Theory and Performance

Love and Barrett (2019) used observations of rehearsals, master classes and in-depth interviews of student-composers, composers, and conductors of one-week composer' workshops to determine critique as a signature pedagogy. Hastings (2016) identified the master class as a critique format and Don et al. (2009) identified one-on-one lessons as signature pedagogies. Don et al. (2009) argued that the signature pedagogy of music must connect theory and performance. Don et al. (2009) identified that these are often taught separately. Researching the theory of music can extend the field beyond the individual lessons and group rehearsals. Merging the fields, music, theory, and performance will integrate skills and knowledge.

Sustainable Food System Education.

Valley et al. (2018) proposed interdisciplinary learning as a signature pedagogy for sustainable food system education (SFSE). Global food insecurity is a multifaceted, uncertain, and unpredictable problem. SFSE programs exist to support post-secondary students in developing skills and knowledge to address the complicated issues in the food system. Valley et al. studied the learning objectives for students at learning institutions and indicated that his research results would begin an "interactive cycle of program improvement" (2018, p. 7).

Undergraduate Theater Programs.

Gray (2015) stated that undergraduate theatre programs need empirical evidence of a signature pedagogy. Gray (2015) evaluated five instructional institutions, examining documents that detailed their approaches and practices to undergraduate theatre assessment, and indicated a broad and varied approach to instruction and evaluation. Gray indicated that determining the signature pedagogy of theatre would reveal the values, policies, approaches, activities, and

practices in theatre education. Gray's research indicated that the performance process, critique by the expert, and conservatory approach were signature pedagogies of theatre instruction.

Art and Design

Art and design areas of study differ in many areas. Many artists begin to learn in the studio by developing their canvas or sculpture, while graphic designers use technology to develop their digital pieces. The studio, the brief, the critique, the sketchbook, and research have been identified as signature pedagogies for art and design (Sims & Shreeve, 2012). Sims and Shreeve acknowledge that access to resources sometimes determines the instructional strategies used, and the increased implementation of technology may cause strategies to change in the future (2012).

Political Science

Political science has two challenges to determining the signature pedagogy: diversity of the discipline and lack of uniformity of instruction (Bernstein, 2012). The lecture is the primary method of instruction for political science classrooms. Bernstein argues that the lecture has its limitations and other methods should be explored.

Economics

The instructional methods for economics courses have changed little since the 1940s (Maier et al., 2012). The economics instructor's main method of instruction has been a lecture. In a study by Watts and Becker (2008, p. 274), the researchers determined that lecture and drawing on a whiteboard was the dominant pedagogical practice. Maier et al. (2012) argues that "economic thinking" should be included as an instructional strategy in economics classrooms (p. 107).

Chemistry

The sciences base many instructional methods on the scientific method. Chemistry has identified undergraduate research as its signature pedagogy (Gravell & Fisher, 2012). In undergraduate research, students learn "original, intellectual, or creative contribution to the discipline" (Kinzie et al., 2010, p. 4). Gravell and Fisher (2012) proposed that undergraduate research locates student learning at its core in laboratory research.

Biological Sciences

Bauer-Dantoin (2012) argues that current biology teachers adopt a constructivist approach when teaching inquiry-based classrooms and labs. The investigator determined that experiment and rigorous, evidence-driven inquiry are the bases for a signature pedagogy. As rigor increases in the curriculum, student engagement will increase and increase the skill of biology graduates**.**

Physics

Lattery (2012) identifies five key instructional strategies for first-year algebra and calculus-based undergraduate physics courses. The author describes traditional instructional strategies such as lecture that may not be effective. The five key signature strategies identified are: (1) modeling method; (2) peer instruction; (3) interactive lecture-demonstration; (4) tutorials in introductory physics; and (5) real-time physics.

Social Work Education

Wayne et al. (2010) stated that field education as the signature pedagogy for the social work profession. Through observation, Wayne et al.(2010) found that field education is "pervasive" to social work education (p. 331). Group structures for learning and teaching in the field were identified as structures for improvement in the practicum.

Information Systems

Djajalaksana (2011) investigated instruction strategies used in teaching information systems, which is the "bridge" between technology systems and information systems (p. 27). A survey of 682 information systems instructors indicated lecture as the number one strategy used with an interactive lecture followed closely in the frequency of use.

Kodaly-Inspired Music

Baumann (2010) investigated the signature pedagogy of Kodaly-inspired music teachers. Kodaly-inspired music education is based on "universal humanism" (Mathias et al., 2005, p. 2). The investigation consisted of two case studies of prominent and influential OAKE-endorsed, Kodaly-inspired teaching education programs and case studies of four to five faculty in these programs. Research determined that instructors used demonstration teaching, master class teaching, and discoverable learning "routinely and habitually" (Mathias et al., 2005, p. 298).

Agriculture

Wattiaux investigated the signature pedagogy in agriculture (2009). In this study, 58 teachers from 38 educational institutions were surveyed. The top three instructional strategies by frequency were lecturing (100%), discussion (47%), and student presentations (41%). Wattiax suggested that because of the nature of agriculture education, an application or capstone course might improve student outcomes.

Education, Law, and Medicine

Shulman (2005c), president of the Carnegie Foundation for the Signature Strategies Advancement of Teaching and Researchers at Stanford University, conducted research that identified the signature pedagogy for education, law, and medicine. Tichenor-Wagner et al. (2016) conducted research with K-12 classroom teachers, looking at professional preparation,

practice, and perception of globally competent pedagogy. Three signature pedagogies identified were integrating varied narratives and international content into the subject area, connecting realistic real-world issues to the subject area, and connecting global personal experiences to the subject by teacher and students.

Importance of Developing a Signature Strategy for CTE

CTE teachers are experiencing greater roles and responsibilities to equip their students with a larger range of skills necessary to make them career and college ready (Cannon et al., 2013). Teacher preparation programs are evaluated through federal, state, and self-evaluation programs. Teacher preparation programs prepare teachers before entering the classroom, but most of the training is on the job (Feuer et al., 2013). Unlike traditional education teacher certification routes, CTE teachers may follow non-traditional routes. According to National Center for Education Statistics (NCES) (2018) 18% of all teachers in the 2015/16 school year had obtained certification alternatively, which was an increase from 4.6% in the 2011/12 school year. Prior research determined that trade, industrial, and health occupation teachers often do not follow the traditional route for state certification (Zirkle et al., 2007). Zirkle determined that agricultural, business, marketing, and family consumer science teachers often follow the traditional route to teacher certification.

Routes to certification vary from state to state (NCES, 2018). Most states require passing a content examination, but do not require any student-teaching component. Alternatively, teachers can become certified through obtaining a provisional license where they learn on the job through a process supervised by the school administration. Because of this lack of experiences, Darling-Hammond (2016) indicated that observing classroom instruction could be beneficial to policy decisions affecting all stakeholders. Instructional strategies are often selected by

instructors based on a cost-benefit analysis (Persky, 2014). Even though interactive classroom instructional strategies are proven to cause better learning outcomes than lecture, instructors often chose lectures as their main instructional strategy. Time and financial resources are barriers to improving teaching practices (Persky, 2014).

Shulman (2005b) defines a signature pedagogy as the "types of teaching that organize the fundamental ways in which future practitioners are educated for their new profession" (p. 52). Signature pedagogies direct teachers and learners in epistemic and axiological foundations of a profession, as well as to the accepted methodological approaches to developing essential professional capacities. Boyer (2004) points out that "pedagogical procedures must be carefully planned, continuously examined, and relate directly to the subject taught" (pp. 23–24). Consequently, instructional pedagogies need discipline-based customization to ensure the success of the transmission, transformation, and extension of knowledge. Pedagogies implicitly determine what counts as knowledge in a field and how things become known. Signature pedagogies define how knowledge is analyzed, criticized, accepted, or discarded. Signature pedagogies also define the "functions of expertise in a field, the locus of authority, and the privileges of rank and standing" (Shulman, 2005b, p. 54).

Creswell (2015) stated that research is important because it adds to our knowledge base, improves practice, and informs policy debate. Fletcher et al. (2015) recommended that more research be conducted to investigate the need for quality CTE teacher preparation programs and that the data should be used to inform higher education administration on the need for CTE programs. This research is supported by Koslowski et al. (2016), whose findings determined that student success based on a variety of outcomes was the number one (M = 4.64) topic on which research in CTE is needed. The number two research need was developing cognitive abilities

through CTE learning (M = 4.27), and the number three research need was methods for connecting CTE curricula to a rapidly evolving workplace (M = 4.27).

The usage of technology and the advancement of technology has changed the knowledge and skills required for the workplace (Nakakoji & Wilson, 2020). Family and consumer sciences teaches career readiness. Way (2009) indicated that the theory and methodology of teaching family and consumer sciences has changed because of research. Way stated that academics must be included in the field of study as well as practical applications. Nichols et al. (2009) noted that changing social, economic, and technology conditions create a need for research agendas to be updated periodically. One example is the STEM education movement that was defined as science, technology, engineering, and mathematics (STEM) (Bybee, 2010). Bybee (2010) indicated that STEM referred to science and math in the 1990s but later acknowledged all the STEM disciplines and the diversity included within them.

Nakakoji & Wilson (2020) stated that problem solving is a desirable skill for employment that is gained through learning. In a study by Helaire (2014), the researcher recommended that CTE instructors implement several diverse classroom instructional strategies for students to be successful in class. Miller et al. (1979) stated that transferring learning to the twenty-first century workplace will be difficult as workplaces change. Redish (1998) stated that to prepare the student for the workforce, teachers need to "understand the differences between most school-based reading and most work-related reading" (p. 224). Gee stated that

> Authentic professionals are people who have special knowledge and distinctive values tied to specific skills gained through a good deal of effort and expertise. They do what they do because they are committed to an identity in which their skills and the knowledge that generates them are valuable and significant (Gee, 207, p. 67).

Because CTE teachers are tasked with instructing a diverse group of students in preparing for the workforce, learning what pedagogies are being used is important (Fletcher & Djajalaksana, 2014b).

Research has provided some insight into CTE classroom instructional strategy implementation. Park et al. (2017) investigated student outcomes when completing CTE coursework. Student outcomes are higher when students are enrolled in rigorous CTE coursework that is designed with industry requirements at the forefront (Park et al., 2017). Previous studies by Rayfield et al. (2011) indicated that high school agriscience teachers were alternatively certified were significantly more likely to differentiate their instruction more than traditionally certified teachers. Additionally, Rayfield et al. (2011) found that critical and creative thinking were used significantly more by high school agriscience teachers who were alternatively certified than traditionally certified teachers. Peercy and Troyan (2017) recommended further research on how teachers teach and how to promote student achievement (Thacker et al., 2017; Webb et al., 2019).

Fletcher and Djajalaksana

Fletcher and Djajalaksana (2014a) investigated CTE classroom instructional strategies used in higher education. Fletcher and Djajalaksana (2014a) determined that family and consumer science teachers were significantly more likely to use writing and conceptualization projects than business and marketing teachers; health occupation teachers were significantly more likely to use writing and conceptualization projects than business and marketing teachers; and teachers in career centers were significantly more likely to use writing and conceptualization projects compared to a teacher in comprehensive high schools. Fletcher and Djajalaksana (2014a) found that family and consumer science teachers used active learning assessments

significantly more than business and marketing teachers. In the same study, Fletcher and Djajalaksana (2014a) determined that teachers of in-seat students were significantly more likely to use active-learning assessment compared to teachers of online students. Another finding was that career center teachers were significantly more likely to use active learning assessment compared to teachers in comprehensive high schools. Fletcher and Djajalaksana (2014a) also found that agriculture teachers were significantly less likely to integrate online activities than business and marketing teachers; online teachers were significantly more likely to use online activities compared with in-seat teachers, and teachers in career centers were more likely to use online activities compare with comprehensive high school teachers.

The Fletcher and Djajalaksana (2014a) study also found that trade and industry teachers were significantly more likely to use real-world activities compared with business and marketing teachers; the higher the degree earned by the teacher, the more likely that the teacher would use real-world activities, and teachers in career centers were significantly more likely to use real-world activities in the courses than teachers in comprehensive high schools. Fletcher and Djajalaksana (2014a) found that engineering and technology teachers were significantly more likely to use knowledge acquisition activities than business and marketing teachers; trade and industry teachers were significantly more likely to use knowledge acquisition activities compared to business and marketing teachers; Native Hawaiian or other Pacific Islander teachers were significantly more likely to use knowledge acquisition activities compared to white teachers; in-seat teachers were significantly more likely to use knowledge activities than online teachers; urban teachers were significantly more likely to use knowledge activities than rural teachers; and career center teachers were significantly more likely to use knowledge activities than teachers in comprehensive high schools. The same study found that African American and

Black teachers were significantly more likely to use teacher-centered activities when compared with White teachers, and in-seat teachers were significantly more likely to use teacher-centered activities when compared to online teachers.

Fletcher and Djajalaksana (2014b) also surveyed P-12 CTE teachers targeting the classroom instructional strategies used in their classrooms. The Fletcher and Djajalaksana (2014b) study involved 362 elementary, middle, and high school teachers. The teachers in this study comprised 57.5% who taught in a comprehensive high school; 23.8% taught in an area career center, 3.3% taught in another setting, 1.4% taught in an alternative school, and 0.3% taught in a private school (2014b). Fletcher and Djajalaksana determined that lab activities, guided practice, and demonstrations were the most used classroom strategies by frequency and could possibly represent the signature pedagogies of CTE teachers (2014b). Fletcher and Djajalaksana (2014b) discussed the infrequent use of technology in classroom instructional strategies that could possibly be integrated into classrooms. Findings from this study recommended CTE P-12 faculty to implement "dynamic, alternative, and novel strategies" (p. 4) to increase higher level thinking of students. Partnership for 21st Century Skills (2010) stated that creativity, critical thinking, innovation, problem solving, and teamwork will be critical twenty-first-century skills for students to learn.

Missouri CTE Teachers

A study of Missouri CTE teachers conducted by Walker and Atkins (2021) discovered significant differences in teacher strategy usage in secondary CTE classrooms. This study showed that teachers who pursued alternative/innovative and career education CTE certification used problem-based learning, project-based learning, and on-the-job training as their preferred classroom strategies. Data showed that teachers who pursued alternative/innovative and career

education CTE certification use problem-based learning, project-based learning, and on-the-job training as their preferred classroom strategies. Teachers with a four-year university with student teaching certification route are usually hired for core and liberal art classes where CTE instructional strategies are not promoted. The researcher recognized that health science classes might use on-the-job training because this strategy has been proven effective in training students so they may earn certification in the workplace. The research led to the researchers to recommend further investigation into CTE classroom strategies.

A gap in the literature exists as to how CTE teachers are differentiating instruction to accommodate all the different demographics of students in the classrooms. When teachers learn more about the learning process, their instructional strategies should become more effective and effective (Hergenhahn & Olson, 2005). Walker and Atkins (2021) indicated that CTE teaching strategies should be further investigated on a larger population and should investigate differences in instructional strategies in career centers to compare them with comprehensive high school classrooms, as studies could impact student achievement. Therefore, this research attempted to close the gap by identifying signature pedagogies used in secondary CTE classrooms in the United States and to determine whether teacher demographics influence their choice of teaching strategies.

Chapter III: Methodology

Overview

The purpose of this study was to investigate the classroom instructional strategies currently being used by career and technical education teachers and to determine if specific demographics impacted the strategies used in the classroom. An additional purpose of this study was to determine if there has been any impact on the classroom instructional strategies caused by moves to online learning in response to Covid-19. The results of this study could reveal a signature pedagogy of CTE. This chapter presents the research design, statement of research questions and null hypothesis, population, data collection instrument, the methodology and data security**,** data collection instrumentation, and the summary.

Research Design

The research used a random convenience sampling of CTE teachers and was a descriptive study. A constructivist philosophical approach to how experiences are interpreted and perceived by individuals at a certain point in time creates a need for quantitative research (Bogdan & Biklen, 2007). The research design for this research was *ex post facto*. Leedy and Ormond (2016) suggested that *ex post facto* design allows the researcher to determine to what extent specific variables affect a dependent variable. The results were examined by identifying "events which have occurred or conditions which are already present" (Leedy & Ormond, 2016, p. 242). An internet survey collected the data for the *ex post facto* research design and the researcher used the results of teacher-completed internet surveys. The Snowball method of delivery was used as national CTE career and technical student organization and state CTE director associations were asked to forward the online survey to the CTE administrators who then forwarded the online

survey to CTE teachers (Laerd, 2020). Purposeful sampling for the research sample allows quantitative research to serve this purpose (Patton, 2015).

Statement of the Research Questions and Null Hypotheses

The following research questions and null hypotheses will be presented for this study:

Research Question 1. What are the potential signature pedagogies used by CTE teachers in their programs?

Research Question 2. To what extent do specific demographics impact a CTE teacher's signature pedagogy?

Research Question 3. Did Covid-19 have an effect on CTE teachers' use of classroom instructional strategies?

The null hypothesis is that the means of all samples will be equal:

H_0: $\mu_1 = \mu_2 = \mu_{3\ldots} = \mu_k$

The alternative hypothesis is that a significant difference exists between the means of at least two population groups:

H_A: $\mu_1 \neq \mu_2$ and/or $\mu_1 \neq \mu_2$ and/or $\mu_2 \neq \mu_3$ …. $\mu_1 \neq \mu_k$

Population and Census

Population

The study used a non-probability convenience sample (Etikan et al., 2016) of all CTE teachers in the United States. The U.S. Department of Education and National Center for Education Statistics (2020) indicated that 98% of all public schools offered CTE programs to high school students in the 2016/17 school year. CTE programs offered classes in agriculture, business, health science, family consumer sciences and human services, marketing, skilled technical sciences, and technology and engineering. Regarding instructors employed at career

and technology shared-time centers, the U.S. Bureau of Labor Statistics (2020) indicated that in 2019, 209,000 CTE teachers were employed nationwide. Of those, 74,520 were employed at the secondary level, 112,210 were post-secondary teachers, and 22,270 were middle school teachers.

Census

The researcher attempted to survey all the CTE certified instructors in the United States. The survey was sent to the CTE state association, the state association of CTE directors in all 50 states, and each national career and technical student organization to be forwarded to their members and then onto CTE teachers. All CTE teachers had the opportunity to participate in the study by having the survey forwarded to them by one of these kinds of associations. The actual number of teachers to whom surveys were actually forwarded is unknown because several national associations declined to participate, and several state associations did not respond to the email requests. The National Business Education Association agreed to forward the survey to 20,000 members. A census was not achieved as the survey had 1,449 respondents, of which only 69% completed the entire survey.

Data Collection Instrumentation

The researcher collected data using a web-based survey using SurveyMonkey. The survey was a modification of a survey used by Fletcher et al. (2012), who developed their base survey to determine signature pedagogies used in the higher education setting (see Appendix A). The original survey consisted of a list of 14 demographic details and 107 instructional strategies and other areas that it was designed to measure. The researcher received approval from Fletcher to modify their instrument for the purpose of this research on August 10, 2018. Both Fletcher's research and this research used a survey instrument that collected data through demographic categories and Likert-type scale questions on instructional strategies used by participants, with

response options that range from Never/Rarely to Almost Always/Always. The survey was designed to take 10 minutes or less of the participant's time and averaged 8 minutes and 22 seconds to complete.

Modification to the Data Collection Instrument

The researcher modified the survey to include six questions in the demographic section to address the research question (see Appendix B). The first modification was to add a question that evaluates whether having an older family member who was a teacher would impact the strategies a current teacher uses in the classroom. The second modification was to add a question that determined which type of CTE certification the current teacher possesses. The third modification added was to determine in which state the respondent teaches. The fourth modification added was to determine how many years the respondent has been teaching.

The following survey questions were added to the data collection instrument to address the focus of this research study. The original survey question number 14 was changed to determine if having a teacher as a parent or guardian or how a teacher became certified might affect what teaching strategies are used in the classroom.

1. How did you receive your teaching certificate?
2. Do you have a parent, guardian, grandparent, aunt, uncle, niece, or nephew who was employed as a preK-12 teacher before you became certified to teach?
3. In which state is the school where you teach located?
4. How many years have you been teaching?
5. Do you teach in a rural or urban school?
6. Where is your primary location of teaching?

7. The following teaching strategies were added: work-based learning, on-the-job training, and project-based learning.
8. Rate how Covid-19 has affected the usage of your classroom instructional strategies.

The following questions were omitted from the survey because they did not serve any purpose in this research.

1. Are you teaching in a higher education setting?
2. What is your position?
3. What level of course do you teach?
4. What is your total years of experience teaching the course identified in Question 3?
5. What is the delivery format of the course identified in Question 3?
6. What is the approximate class size of the course identified in Question 3?
7. What is the institution type where you teach the course identified in Question 3?
8. What is the name of the institution?
9. What is the location of the institution?
10. What is your gender?
11. What is your age?
12. What is your ethnicity?
13. Should we need more insight from you, would you be willing to follow up with a phone interview?

Institutional Review Board (IRB)

Before research began, the researcher completed the Collaborative Institutional Training Initiative Program training and obtained IRB approval from Murray State University. The researcher determined that the data collected by this research required an Institutional Review

(IRB) Level 1 (Murray State, 2020). The researcher determined this because (1) the research participants did not incur any risk greater than minimal, (2) this study did not collect any identifying information and was not harmful to a participant's financial standing, employability, or reputation, or involve the participants any criminal activity or civil liability, and (3) the research did not involve minors, prisoners, pregnant women, fetuses, or in vitro fertilization. The researcher determined the data collected was Category 1 data under Level 1 because it was research on regular and special education strategies; research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods; or research which would not adversely impact the student's opportunity to learn educational content or the assessment of the educators who provide the instruction (Murray State, 2020). Murray State University granted IRB approval number 21-091 on January 22, 2021 (Appendix C).

Data Collection

Prior to data collection, the researcher attempted to obtain permission from each state's CTE association directors, each state's CTE state coordinator, and the national career and technical student organization (CTSO) directors to assist with disseminating the research instrument. The researcher sent the survey to each of the CTSO directors, to each state CTE director, and to each state CTE association director requesting them to forward the email with the survey embedded in the email. The first email was forwarded to each of the area career center directors, comprehensive high school principals, and post-secondary CTE administrators. The administrators would include secondary and post-secondary education leaders. The area career-center directors and other CTE administrators belong to the state associations. After IRB approval was granted, the researcher emailed the survey with the embedded consent form (Appendix D) to the state CTE directors requesting them to forward an email survey to all their

state's CTE administrators, which would include secondary and post-secondary education leaders; this email was followed as soon as possible by an email containing the survey link for state administrators.

The first email was sent out on March 1, 2021. Seven days after the first round of emails were sent, the researcher sent a reminder email to the recipients of the original email. Fourteen days after the original email, the researcher sent a final reminder email to the recipients of the original email. The survey closed on March 31, 2021, with 1,449 responses. The number of teachers who received the email with the survey embedded and chose not to participate is unknown.

The original email to administrators described the research and requested them to forward the email to their certified teaching staff. The email included a link to the online survey, which contained an embedded consent form (Appendix D). Participants were required to acknowledge the consent form before entering the survey. The email stated that the data collected would be totally anonymous and would have no impact on their employment status. At the bottom of the email was a link to the online survey that provided the participants with an informed consent form before they began the survey. The recipients were asked to complete the survey within 48 hours of receiving it. Cook et al. (2000) found that average response rates ranged from 25% to 35% for Internet-based surveys.

Methodology and Data Security

Procedure for Data Analysis

The researcher analyzed the data by the demographic categories, including which state the teacher worked in, the geographical setting of the school the teacher worked in, the type of school the teacher worked in, the subject area the teacher taught, the teacher's certification route,

number of years of experience, and if the teacher had a person of significance in their life who was a teacher to identify possible relationships between demographic attributes. Participants were coded to a region of the United States according to the state they stated they were teaching in. The regional affiliation was then used to compare teachers' data from one region to other regions. Following the initial non-statistical data analyses, data was analyzed using descriptive and inferential statistics.

The results from survey questions 10 through 16 were used to determine the potential signature pedagogies in CTE. The teacher's answers to these questions indicated how often they used each strategy. Values were assigned to the survey responses. A value of six points was assigned to "Always," five points to "Almost Always," four points to "Frequently," three points to "Occasionally," two points to "Rarely," and one point to "Never." Using the Likert-type data, the means of the results were analyzing to determine the three signature pedagogies of CTE. The means of the data were used. Sullivan and Artino (2013) stated that using the means of the data is "recommended, particularly when researchers are attempting to measure less concrete concepts" (p. 1). Harpe (2015) stated that that the arithmetic mean is recommended for analyzing the interval data. For the purpose of this study, the arithmetic mean of the Likert-type responses will be used to determine the signature pedagogies of CTE.

The top three classroom instructional strategies by frequency were determined by asking teachers to select their three most-used strategies from a pool of strategies. Question 17 asked teachers to choose the three strategies they use the most frequently. The data from Question 17 was used to determine the most frequently used and the least frequently used strategies. The data from survey question 19 were used to determine if Covid-19 has had any effect on classroom instructional strategies.

The results from survey questions 10 through 16 were further analyzed. The teacher's answers to these questions indicated how often they used each strategy. Values were assigned to the survey responses. A value of six points was assigned to "Always," five points to "Almost Always," four points to "Frequently," three points to "Occasionally," two points to "Rarely," and one point to "Never." The nominal and ordinal level data were examined using Kruskal-Wallis H tests with post hoc tests performed on the data to identify if any significant differences exist.

The Kruskal-Wallis test is a nonparametric test used to identify any significant differences in ordinal data by ranking the data and comparing "the median ranks for all groups with the individual group medians" (Aldrich, 2019, p. 189). Laerd Statistics (2020) stated that the Kruskal-Wallis H test could determine if there are any "statistically significant differences between two or more groups of an independent variable on a continuous or ordinal dependent variable" (p. 1). Laerd Statistics (2020) also stated that the Kruskal-Wallis H test could not determine which groups of the independent variable are statistically different from each other, and an ad hoc test would need to determine which groups are statistically different from each other. McDonald (2015) indicated that the Kruskal-Wallis test is used when one nominal variable and one measurement variable do not meet the normality assumption of the one-way ANOVA test. The Kruskal-Wallis test uses mean rank, which is a one-way non-parametric method for testing whether samples originate from the same distribution.

The Kruskal-Wallis test is also used for comparing two or more independent samples of equal or different sizes (McDonald, 2015). The Kruskal-Wallis H test is used when four assumptions are present: (1) the depended variable is measured on the ordinal or continuous scale; (2) the independent variable should consist of two or more categorical, independent

groups; (3) an independence of observations exist; and (4) the distributions of each group have the same shape or the same variability (Laerd Statistics, 2020). The Kruskal-Wallis test does not assume that the data comes from a distribution that can be completely described by the mean and standard deviation and does not assume that the data are normal. McDonald (2015) recommends using the Kruskal-Wallis test when the original data set is made up of one nominal variable and one ranked variable.

When the Kruskal-Wallis test identifies an overall significance between groups, an H test, which is a pairwise comparison post hoc test, is used to determine which two groups are significantly different. The steps of the H test are: (1) sort the data for all groups into ascending order in a combined set; (2) assign ranks to the sorted data points; (3) add the different ranks for each sample; (4) calculate the H statistic; and (5) find the critical chi-square value, with c-1 degrees of freedom at α level .05. If the critical chi-square value is less than the H statistic, then the null hypothesis is rejected (Glenn, 2020).

Validity

Content validity (DeVellis, 2003) was measured by a panel of six experts, referred to as CTE evaluators. The experts included faculty in agricultural, family consumer sciences, and business and marketing. After the modification to the Fletcher et al. (2012) survey was completed, the survey (Appendix B) was converted into a SurveyMonkey electronic survey and modified to meet the needs of this research.

Data Security

At the end of the data collection period, the data from the SurveyMonkey online survey was sorted and analyzed. The data was exported into the SPSS v26 software for analysis. Data was kept confidential with a password-protected security system on the researcher's computer,

and the initial nonstatistical data analyses was conducted through data scanning and locating trends in the data.

Summary

Chapter III outlined the procedures and methods the researcher used to conduct this quantitative study as it pertains to CTE teachers, the use of classroom instructional strategies, and any effects of Covid-19 on the potential changes to classroom instructional strategy usage. The researcher incorporated the ex post facto research design. Survey responses were provided by CTE teachers working in middle schools, comprehensive high schools, area career centers, and higher education in the United States. The data collection instrument was a modification of a previous survey used by Fletcher et al. (2012) to determine signature pedagogies used by higher education CTE teachers. Results were examined through frequency, means, and mean rank using analytic and inferential statistics. The Kruskal-Wallis test identified any differences between the means. The researcher then performed the H test to determine if any significant differences exist in the results of the survey. Chapter IV will provide a detailed account of the data, and chapter V will present researcher recommendations.

Chapter IV: Findings and Analysis

Overview

The purpose of this study was to investigate the classroom instructional strategies currently being used by career and technical education teachers and to determine if specific demographics impacted the strategies used in the classroom. An additional purpose of this study was to determine if there has been any impact on the classroom instructional strategies caused by moves to online learning in response to Covid-19. The results of this study could reveal a signature pedagogy of CTE.

Chapter IV provides the results of the survey and the analysis of the data used for this study. CTE teachers' subject areas are very diverse and at the time of this study, little research was located regarding CTE teachers' decisions of what classroom instructional strategies to use in each of their individual disciplines. This chapter presents an overview of the research and the data that was collected. These data are presented in the following sections: demographic results, research question data overview, Research Question 1 data, Research Question 2 data, Research Question 3 data, additional findings, and summary. The findings of Chapter IV may be generalizable to all CTE teachers (Creswell, 2015). All data was collected through an electronic survey disseminated through email.

Demographic Results

The following demographic data are presented in this section: number of participants, teaching region, geographical setting, type of school, subject area taught, certification method, years of experience, and familial influences.

Number of Participants

Of the 1,449 participants who started the survey, 28 participants chose not to enter the survey. Of the 1,421 who entered the survey, 110 (8.85%) indicated they were not CTE teacher. The number of CTE teachers who completed the entire survey was 1,106.

Teaching Region

Participants were asked to select the state in which their school was located. The four states with the most participants responding were Missouri (n = 355, 26.41%), Georgia (n = 101, 7.51%), Washington (n = 74, 5.51%), and Oklahoma (n = 73, 5.43%). Of the 1,344 participants who answered this question, three were unsure and eight preferred not to answer. States with only one respondent were Alaska, Delaware, South Carolina, and West Virginia. The only states without a respondent were Hawaii and North Dakota.

Respondent data was divided into four regions according to the U.S. Census Bureau (2021). The four regions were Pacific, West, Midwest, South, and Northeast. The region with the most teachers was the Midwest (n = 461, 41.7%). The number of teachers from the other regions were the Northeast (n = 72, 6.5%), South (353, 31.9%), and the Pacific (n = 206, 18.6%).

Table 1

Participant Demographics by Region

Regions	Frequency	Percent
Northeast	72	6.5
South	353	31.9
Midwest	461	41.7
Pacific	206	18.6
Total	1,092	98.7

Geographical Setting

Of the participants, 1,086 answered the question about their geographical setting. Of the 1,086 respondents, the setting most represented was rural (n = 560, 50.6%). The setting least represented was urban (n = 170, 15.4%). Of the participants, 20 (1.8%) did not indicate which setting they taught in, four (.4%) preferred not to answer, and 20 (1.8%) did not answer the question. See Table 2.

Table 2

Participant Demographics by Geographical Setting of School

Geographic setting	Frequency	Percent
Urban	170	15.4
Rural	560	50.6
Suburban	332	30.0
I am not sure	20	1.8
I prefer not to answer	4	0.4
Total	1,086	98.2

Type of School

Of the participants, 1,106 answered the question about what type of school they taught in. Of the 1,106 respondents, the type of school most represented was a comprehensive high school (n = 704, 63.7%). The type of school least represented was a four-year university (n = 22, 2.0%). Of the 1,329 participants, 29 (2.6%) indicated they were not sure what type of school they taught in. Of the survey participants, 12 (1.1%) did not complete the question.

Table 3

Participant Demographics by Type of School

Type of School	Frequency	Percent
Area career center	290	26.2
Comprehensive high school	704	63.7
Community college	49	4.4
Four-year university	22	2.0
I am not sure	29	2.6
Total	1,094	98.9

Subject Area

Of the participants, 1,106 answered the question about what subject area they taught. The subject area indicated most often was business, marketing, and information technology (n = 342, 30.9%). The subject area indicated the least was skilled technical sciences, with 101 teachers selecting this subject area (n = 101, 9.1%).

Table 4

Participant Demographics by Subject Area

Subject Area	Frequency	Percent	Valid Percent
Agriculture	114	10.3	10.3
Business, Marketing, and Information Technology	342	30.9	30.9
Family Consumer Sciences & Human Services	248	22.4	22.4
Skilled Technical Sciences	101	9.1	9.1
Health Sciences	124	11.2	11.2
Engineering and Technology	177	16.0	16.0
Total	106	100	100

Certification Method

Of all respondents, 1,106 completed the question indicating their route to teaching certification. The route to teaching certification indicated most often was the traditional method

through a four-year university with a student teaching component (n = 569, 51.40%). The route to teaching certification indicated the least often was the career education certification method: CTTE cohort curses (e.g., based on industry, clinical or military experience, completing required CTTE cohort courses) (n = 90, 8.10%). See Table 5.

Table 5

Participant Demographics by Teaching Certification Method

Certification Method	Frequency	Percent
Traditional method through a four-year university with a student teaching component	569	51.4
Alternative or innovative method (e.g., post-baccalaureate with teaching internship; ABCTE; other state-approved program)	217	19.6
Career education method: traditional CTE coursework (e.g., based on industry, clinical, or military experience)	230	20.8
Career education method: CTTE cohort courses (e.g., based on industry, clinical, or military experiences)	90	8.1
Total	1,106	100.0

Years of Experience

Of the participants, 1,106 indicated the range of their number of years teaching. Of the 1106, the range most often indicated was more than 23 years (n = 234, 21.20%). Of the 1,106, participants, the range least often indicated was 0 to 3 years (n = 123, 11.10%). Two participants did not complete the question (.2%). See Table 6.

Table 6

Participant Demographics by Years of Teaching Experience

Years of Teaching Experience	Frequency	Percent
0–3 years	123	11.1
4–7 years	169	15.3
8–11 years	145	13.1
12–15 years	132	11.9
16–19 years	163	14.7
20–23 years	138	12.5
more than 23 years	234	21.2
Total	1,104	99.8

Familial Differences

Of the respondents, 1,106 answered the question referring to having a person of significance in their life as a teacher (e.g., a parent/guardian, grandparent, aunt, uncle, sibling, another teacher, etc.). Of the 1,106 who did answer the question, 681 (61.60%) indicated they did have a person of significant interest in their life who was a teacher, while 420 (38.0%) indicated they did not have a person of significant interest in their life who was a teacher. Of the 1,123 participants, five (0.5%) indicated that they prefer not to answer the question. See Table 7.

Table 7

Participant Demographic by Having a Person of Significance Who Was a Teacher

Participant Response	Frequency	Percent
Yes	681	61.6
No	420	38.0
I prefer not to answer	5	0.5
Total	1,106	100.0

Research Question Data Overview

This section presents the research findings as related to the specific research questions. This section will present the statistical analysis of the survey data. A summary of the three most-used classroom instructional strategies is displayed in Table 8. The complete survey results and data analyses are in Appendices E through O. The findings of chapter IV may be generalizable to the population of all CTE teachers. Leedy and Ormond (2016) stated that for the population of CTE teachers of 209,000 (N = 209,000) a sample size of 780 (n =780) would be required for a normal distribution of the data to the population.

Research Question 1 Data

Research Question 1 was "What are the potential signature pedagogue used by CTE teachers in their programs?" Survey questions 10 through 16 were used to collect the supporting evidence for Research Question 1. Participants were asked to choose how often they used specific classroom strategies. Responses ranged from a 6 ("Always") to a 1 ("Never). The number of CTE teachers participating in Research Question 1 data are the CTE teachers who completed the descriptive statistics questions.

Signature Pedagogies

The results from survey questions 10 through 16 were used to determine the potential signature pedagogies in CTE. The teacher's answers to these questions indicated how often they used each strategy. Values were assigned to the survey responses. A value of six points was assigned to "Always," five points to "Almost Always," four points to "Frequently," three points to "Occasionally," two points to "Rarely," and one point to "Never." Using the Likert-type data, the means of the results were analyzing to determine the three signature pedagogies of CTE. Sullivan and Artino (2013) stated that using the means of the is data is "recommended,

particularly when researchers are attempting to measure less concrete concepts" (p. 1). Harpe (2015) stated that that the arithmetic mean is recommended for analyzing the interval data. For the purpose of this study, the arithmetic mean of the Likert-type responses will be used to determine the signature pedagogies of CTE.

The five most-used classroom instructional strategies were determined by analyzing the data from participant responses to questions 10 through 16. The mean response was calculated for each strategy. The five most-used classroom instructional strategies identified were questioning ($\bar{x}$ = 3.89, SD = .99), guided practice ($\bar{x}$ = 3.69, SD = 1.00), demonstrations, ($\bar{x}$ = 3.58, SD = 1.19), lab activities ($\bar{x}$ = 3.57, SD = 1.41), and whole group discussion ($\bar{x}$ = 3.43, SD = 1.11). See the complete data set in Appendix E.

Least-Used Instructional Strategies

After analyzing the data from survey questions 10 through 16, the researcher determined the five least-used instructional strategies. The five least-used instructional strategies were original research proposal ($\bar{x}$ = 1.03, SD = 1.10), student-generated quiz/exams ($\bar{x}$ = 1.05, SD = 1.18), participation in social networking ($\bar{x}$ = 1.21, SD = 1.28), minute paper/sentence summary ($\bar{x}$ = 1.23, SD = 1.26), annotated bibliography/webliography ($\bar{x}$ = 1.32, SD = .70). (Survey questions 13 and 16 gave the participants the option of *Other*; participants who selected *Other* provided 37 responses. Of those responses, the most indicated were project-based learning (n = 6), on-the-job learning (n = 3), and Kagan strategies (n = 3). No *Other* responses were indicated more than once. See all 37 responses in Appendix E.

Pooled Frequency of the Three Most-Used Classroom Instructional Strategies

Using the data from survey question 17, the researcher determined the three most-used classroom instructional strategies based on the percentage of participants who identified

strategies they used. A list from Fletcher et al. (2012) was used for survey question 17, which asked participants to choose their top three classroom instructional strategies. After analyzing the data from survey question 17, the researcher then compared them to the percentage of participants who used each strategy and the frequency of their use as a percentage. The top three strategies identified by the 1,024 participants answering the question were interactive lecture (n = 336, 32.81%), lab activities (n = 290, 28.32%), and project-based learning (n = 289, 28.22%). See the complete data set in Appendix F.

Pooled Frequency of the Least-Used Classroom Instructional Strategies

The researcher used data from survey question 17 to determine the least-used instructional strategies based on a percentage of participants that selected them as classroom instructional strategies that they use. Fletcher (2012) developed the list of strategies used in survey question 17. The classroom instructional strategies least used by the 1,024 participants who answered survey question 17 were literature review (n = 1, .10%), social networking (n = 1, .10%), and annotated bibliography/webliography (n = 0, 0%). In survey question 18, which allowed participants to specify an *Other* strategy, participants added 60 classroom instructional strategies that were not listed in survey question 17. See the complete data set in Appendix F.

Top Classroom Instructional Strategies by Instructors' CTE Content Area

The researcher determined participants' three most frequently used classroom instructional strategies by CTE subject area. The mean of participants responses was used to determine the most-used of each strategy was calculated for each strategy. See Table 8 for a ranking of all the strategies and see Appendix G for the complete data set.

Table 8

Top Three Classroom Instructional Strategies Used in Each Subject Area

CTE Subject Area	Strategy	Mean	Std. Deviation
Agriculture	Questioning	3.8	0.91
	Whole Group Discussion	3.44	0.99
	Lab Activities	3.39	1.175
Business, Marketing, and Information Technology	Questioning	3.82	1.07
	Guided Practice	3.67	1.02
	Project-Based Learning	3.40	1.29
Family Consumer Science and Human Services	Lab Activities	3.92	1.17
	Questioning	3.93	0.95
	Guided Practice	3.71	0.95
Skilled Technical Sciences	Lab Activities	4.20	1.18
	Demonstrations	4.18	1.05
	Questioning	3.97	0.95
Health Sciences	Questioning	4.01	0.91
	Lab Activities	3.85	1.04
	Demonstrations	3.71	1.20

Top Classroom Instructional Strategies by Instructors' Region

The researcher determined the three most frequently used classroom instructional strategies by participants region. The four most frequently used classroom instructional strategies in the Northeast region are project-based learning (n = 23), guided practice (n = 22), interactive lecture (n = 17), and lab activities (n = 17). The three most frequently used classroom instructional strategies in the South region are interactive lecture (n = 106), lab activities (n = 89), and project-based learning (n = 87). The three most frequently used classroom instructional strategies in the Midwest region are interactive lecture (n = 139), lab activities (n = 127), and project-based learning (n = 125). The three most frequently used classroom instructional strategies in the Pacific region are interactive lecture (n = 71), lab activities (n = 56), and project-based learning (n = 51). See complete results in Appendix H.

Top Strategies by Type of School

The researcher determined the three most frequently used classroom instructional strategies by participants' type of school. The top three classroom instructional strategies used in an area career center were lab activities (n = 89), project-based learning (n = 82), and interactive lecture (n = 72). The top three classroom instructional strategies used in a comprehensive high school were interactive lecture (n = 230), project-based learning (n = 179), and role play (n = 171). The top three classroom instructional strategies used in a community college were interactive lecture (n = 17), role play (n = 14), and project-based learning (n = 13). The top three classroom instructional strategies used in a four-year university were role play (n = 5), major writing project/term paper (n = 4), and computer-based learning exercises/game simulations (n = 4). See entire results in Appendix I.

Research Question 2 Data Analysis

This section presents the Research Question 2 data. Research Question 2 was "To what extend do specific demographics impact a CTE teacher's signature pedagogy?" CTE teacher demographics would have no effect on what classroom instructional strategies are used in the classroom was the null hypothesis. The null hypothesis was rejected. The analysis of the statistical tests is presented later in this chapter.

The responses to survey questions 10 through 16 were analyzed using the Kruskal-Wallis H test and any potential significant differences were analyzed using a pairwise post hoc test to determine if any significant difference exists and to what level it exists. Aldrich (2019) stated that comparing the mean rank within the median ranks is a method of using the Kruskal-Wallis H test to determine significant differences in ordinal data (p. 189). After the Kruskal-Wallis H test

identifies a potential difference, then the post hoc pairwise test determines which two groups are significantly different.

Comparative Usage of Strategies by Person of Significance Who Was a Teacher

The researcher identified the top three classroom instructional strategies used by participants who indicated they had a person of significance in their lives who also was a classroom teacher and by participants that indicated that they did not have a person of significance in their lives who also was a classroom teacher. The analysis was conducted by using Likert-type scale questions where participants selected how often they used a strategy. The responses ranged from a 1 ("Never") to a 6 ("Always"). The mean of each response was calculated for each strategy and the complete data set is in Appendix J.

After the Kruskal-Wallis H test and the post hoc test of the mean rank scores of each strategy, the researcher determined the use of games was significantly different between the two groups of teachers. The teachers with someone of significance in their life who was a teacher (mean rank = 463.29) used games significantly more than teachers without someone of significance in their life who was a teacher (mean rank = 417.14) ($x^2(2) = 7.406$, $p < .05$). Of the survey participants, 196 chose *I prefer not to answer*. See complete results in Appendix J.

The top three classroom instructional strategies used by teachers with someone of significance in their life who was a teacher were questioning ($\bar{x}$ = 3.9034, SD = .96), guided practice ($\bar{x}$ = 3.7015, SD = .99, and lab activities ($\bar{x}$ = 3.567, SD = 1.39). The top three classroom instructional strategies used by teachers without someone of significance in their life as a teacher were questioning ($\bar{x}$ = 3.87, SD = 1.03), guided practice ($\bar{x}$ = 3.66, SD = 1.00), and demonstrations ($\bar{x}$ = 3.61, SD = 1.86).

Comparative Usage of Strategies by Region

The researcher compared the mean ranked scores using the Kruskal-Wallis H test to determine if any potential difference existed and then a pairwise post hoc test to determine if a significance existed between the different regions and classroom instructional strategy usage. See the complete data set in Appendix H. The research suggests the following differences in instructional strategies used by teachers in different regions.

Student Demonstrations. Teachers in the Northeast (mean rank = 636.94) use student demonstrations significantly more than teachers in the Midwest (mean rank = 533.00) ($x^2(3) = 11.037$, $p < .05$). Teachers in the Northeast (mean rank = 648.98) use student presentations significantly more than teachers in the Midwest (mean rank = 514.31) ($x^2(3) = 13.043$, $p < .05$).

Quizzes. Teachers in the South (mean rank = 568.98) use quizzes significantly more than teachers in the Midwest (mean rank = 507.33) ($x^2(3) = 10.783$, $p < .05$). T

Learning Portfolio. Teachers in the South (mean rank = 568.54) and the Northeast (mean rank = 629.51) use learning portfolio significantly more than teachers in the Midwest (mean rank = 486.45).

Student Attitude Survey. Teachers in the South (mean rank = 555.78) and the Pacific (mean rank = 473.81) use student attitude survey significantly more than teachers in the Midwest (mean rank = 482.28) ($x^2(3) = 20.641$, $p < .01$).

Asynchronous Online Lecture. Teachers in the Northeast (mean rank = 561.63), the South (mean rank = 523.42), and the Pacific (mean rank = 561.63) use asynchronous online lecture significantly more than teachers in the Midwest (mean rank = 452.14) ($x^2(3) = 20.336$, $p < .01$).

Literature Review. Teachers in the South (mean rank = 532.74) and the Northeast (mean rank = 563.71) use literature review significantly more than teachers in the Pacific (mean rank = 451.93) ($x^2(3) = 14.328$, $p < .01$).

Online/E-portfolio. Teachers in the Northeast (mean rank = 591.49) and the South (mean rank = 538.83) use online/e-portfolio significantly more than teachers in the Pacific (mean rank = 463.90). Teachers in the Northeast (mean rank = 591.49) and the South (mean rank = 538.83) use online/e-portfolio significantly more than teachers in the Midwest (mean rank = 475.11) ($x^2(3) = 19.302$, $p < .01$).

Case Study. Teachers in the Northeast (mean rank = 580.42) use case study significantly more than teachers in the Pacific (mean rank = 467.68) ($x^2(3) = 8.732$, $p < .05$).

Debates. Teachers in the South (mean rank = 526.85) use debates significantly more than teachers in the Pacific (mean rank = 451.23) ($x^2(3) = 10.524$, $p < .05$).

Original Research. Teachers in the Northeast (mean rank = 577.39) use original research significantly more than teachers in the Midwest (mean rank = 469.76) ($x^2(3) = 11.558$, $p < .01$).

Campus Events. Teachers in the Pacific (mean rank = 523.84) and the South (mean rank = 549.92) use campus events significantly more than teachers in the Midwest (mean rank = 443.25) ($x^2(3) = 29.682$, $p < .01$).

Film/Video. Teachers in the Northeast (mean rank = 597.25) use film/video significantly more than teachers in the Midwest (mean rank = 482.54) ($x^2(3) = 9.349$, $p < .01$).

Synchronous Online Lecture. Teachers in the Pacific (mean rank = 542.26), the South (mean rank = 533.20), and the Northeast (mean rank = 606.89) use synchronous online lecture significantly more than teachers in the Midwest (mean rank = 438.01) ($x^2(3) = 38.193$, $p < .01$).

Social Networking. Teachers in the South (mean rank = 553.95) use participating in social networking significantly more than teachers in the Midwest (mean rank = 461.29) ($x^2(3) = 23.005$, $p < .01$).

Comparative Usage of Strategies by Teacher Certification Method

The researcher compared the mean ranked scores using the Kruskal-Wallis H test and then a pairwise post hoc test to determine if a difference existed between classroom instructional strategies used by teachers with different certification methods. See the complete data set in Appendix K. The research suggests the following differences in instructional methods used by teachers with different certification methods.

Guided Practice. Teachers with career education certification: traditional CTE coursework (mean rank = 563.78) use guided practice significantly more than teachers with alternative or innovative certification (mean rank = 480.35 ($x^2(3) = 13.258$, $p < .01$).

Interactive Lecture. Teachers with career education certification: traditional CTE coursework (mean rank = 580.86) use interactive lecture significantly more than teachers with alternative or innovative teacher certification (mean rank = 480.35) ($x^2(3) = 8.342$, $p < .05$). Teachers with career education certification: CTTE cohort courses (mean rank = 530.95) use interactive lecture significantly more than teachers with alternative or innovative certification (mean rank = 503.87) ($x^2(3) = 8.342$, $p < .05$).

Self-Directed Learning. Teachers with alternative or innovative certification (mean rank = 557.88) use self-directed learning significantly more than teachers with career education certification: CTTE cohort courses (mean rank = 450.83) ($x^2(3) = 8.735$, $p < .05$).

Lab Activities. Teachers with career education certification: traditional CTE coursework (mean rank = 548.88) use lab activities significantly more than teachers with a traditional method of certification (mean rank = 541.59) ($x^2(3) = 26.969$, $p < .01$).

Demonstration. Teachers with career education certification: traditional CTE coursework (mean rank = 639.54) and teachers with career education certification: CTTE cohort courses (mean rank = 657.77) use demonstrations significantly more than teachers with a traditional method of certification (mean rank = 501.65). Teachers with career education certification: CTTE cohort courses (mean rank = 657.77) and teachers with career education certification: traditional CTE coursework (mean rank = 639.54) use demonstrations significantly more than teachers with alternative or innovative certification (mean rank = 503.60) ($x^2(3) = 49.419$, $p < .01$).

Quizzes. Teachers with career education certification: traditional CTE coursework (mean rank = 621.08) use quizzes significantly more than teachers with a traditional method of certification (mean rank = 496.44) ($x^2(3) = 27.939$, $p < .01$).

Student Attitude Survey. Teachers with career education certification: traditional CTE coursework (mean rank = 606.69) used student attitude survey significantly more than teachers with a traditional method of certification (517.72). Teachers with career education certification: traditional CTE coursework (mean rank = 606.69) use student attitude survey significantly more than teachers with alternative or innovative certification (mean rank = 518.34) ($x^2(3) = 15.262$, $p < .01$).

Review Sessions. Teachers with career education certification: traditional CTE coursework (mean rank = 578.78) and teachers with career education certification: CTTE cohort courses (mean rank = 581.36) use review sessions significantly more than teachers with

alternative or innovative certification (mean rank = 468.45). Teachers with career education certification: traditional CTE coursework (mean rank = 578.78) and teachers with career education certification: CTTE cohort courses (mean rank = 581.36) use review sessions significantly more than teachers with a traditional method of certification (mean rank = 488.72) ($x^2(3) = 24.616$, $p < .01$).

Literature Review. Teachers with career education certification: traditional CTE coursework (mean rank = 562.26) use literature review significantly more than teachers with a traditional method of certification (mean rank = 477.20) ($x^2(3) = 20.111$, $p < .01$). Teachers with career education certification: traditional CTE coursework (mean rank = 562.26), and teachers with career education certification: CTTE cohort courses (mean rank = 610.83) use literature review significantly more than teachers with alternative or innovative certification (mean rank = 481.69) ($x^2(3) = 26.230$, $p < .01$).

Role Play. Teachers with career education certification: traditional CTE coursework (mean rank = 555.88) use role play significantly more than teachers with a traditional method of certification (mean rank = 469.40) ($x^2(3) = 24.258$, $p < .01$).

Computer Simulations. Teachers with alternative or innovative certification (mean rank = 555.22) use computer simulations significantly more than teachers with career education certification: CTTE cohort courses (mean rank = 485.94) ($x^2(3) = 8.950$, $p < .05$).

Concept Maps. Teachers with a traditional method of certification (mean rank = 532.75) use the concept maps significantly more than teachers with alternative or innovative certification (mean rank = 464.23) ($x^2(3) = 12.760$, $p < .01$). T

Campus Events. Teachers with career education certification: traditional CTE coursework (mean rank = 552.86) use campus events significantly more than teachers with a traditional method of certification (mean rank = 484.55) ($x^2(3) = 12.474$, $p < .01$).

Service Learning. Teachers with career education certification: traditional CTE coursework (mean rank = 547.54) use service learning significantly more than teachers with alternative or innovative certification (mean rank = 453.65) ($x^2(3) = 12.122$, $p < .01$).

On-the-Job Training. Teachers with career education certification: traditional CTE coursework (mean rank = 592.03) and teachers with career education certification: CTTE cohort courses (mean rank = 574.64) use on-the-job training significantly more than more than teachers with alternative or innovative certification (mean rank = 433.46). Teachers with career education certification: traditional CTE coursework (mean rank = 592.03) use on-the-job training significantly more than teachers with a traditional method of certification (mean rank = 487.05) ($x^2(3) = 38.296$, $p < .01$).

Work-Based Learning. Teachers with a traditional method of certification (mean rank = 504.81), teachers with career education certification: traditional CTE coursework (mean rank = 561.89), and teachers with career education certification: CTTE cohort courses (mean rank = 545.96) use work-based learning significantly more than teachers with alternative or innovative certification (mean rank = 423.05) ($x^2(3) = 26.374$, $p < .01$).

Usage of Strategies by Number of Years Teaching Experience

The researcher compared the mean ranked scores using the Kruskal-Wallis H test and then a pairwise post hoc test to determine if a significance existed between a teachers' years of experience and classroom instructional strategy usage. See the complete data set in Appendix L.

The research suggested the following differences in instructional methods used by teachers with different years of experience.

Guided Practice. Teachers with 20 to 23 years of experience (mean rank = 562.00), teachers with 16 to 19 years of experience (mean rank = 576.95), and teachers with more than 23 years of experience (mean rank = 577.91) use guided practice significantly more than teachers with 0 to 3 years of experience (mean rank = 440.75) ($x^2(6) = 23.990$, $p < .05$).

Self-Directed Learning. Teachers with 16 to 19 years of experience (mean rank = 597.88) use self-directed learning significantly more than teachers with 0 to 3 years (mean rank = 485.92) ($x^2(6) = 15.828$, $p < .05$).

Major Writing. Teachers with more than 23 years of experience (mean rank = 600.58) use major writing significantly more than teachers with 0 to 3 years of experience (mean rank = 489.33) ($x^2(6) = 15.989$, $p < .01$).

Student Peer Assessment. Teachers with 4 to 7 years of experience (mean rank = 576.06) and teachers with 8 to 11 years of experience (mean rank = 549.92) use student peer assessment significantly more than teachers with 0 to 3 years of experience (mean rank = 445.64) ($x^2(6) = 15.490$, $p < .05$).

Learning Portfolio. Teachers with 4 to 7 years of experience (mean rank = 533.45), teachers with 8 to 11 years of experience (mean rank = 565.00), teachers with 12 to 15 years of experience (mean rank = 549.61), teachers with 16 to 19 years of experience (mean rank = 542.40), teachers with 20 to 23 years of experience (mean rank = 554.40), and teachers with more than 23 years of experience (mean rank = 567.47) use learning portfolio significantly more than teachers with 0 to 3 years of experience (mean rank = 400.96 ($x^2(6) = 28.693$, $p < .01$).

Online/E-portfolio. Teachers with 8 to 11 years of experience (mean rank = 561.74) use online/e-portfolio significantly more than teachers with 0 to 3 years of experience (mean rank = 428 ($x^2(6) = 15.295$, $p < .05$).

Guest Lecture. Teachers with 4 to 7 years (mean rank = 508.94), teachers with more than 23 years of experience (mean rank = 529.91), and teachers with 0 to 3 years of experience (mean rank = 385.61) use guest lecture significantly more than teachers with 0 to 3 years of experience (mean rank = 385) ($x^2(6) = 23.457$, $p < .01$). T

Problem-Based Learning. Teachers with more than 23 years of experience (mean rank = 524.11) use problem-based learning significantly more than teachers with 0 to 3 years of experience (mean rank = 423.41) ($x^2(6) = 16.182$, $p < .05$).

Campus Event. Teachers with 4 to 7 years of experience (mean rank = 549.27) used campus event significantly more than teachers with 0 to 3 years of experience (mean rank = 418.80) ($x^2(6) = 17.257$, $p < .01$).

Field Trip. Teachers with more than 23 years of experience (mean rank = 532.69) use field trip significantly more than teachers with 0 to 3 years of experience (mean rank = 412.36) ($x^2(6) = 16.262$, $p < .05$).

Project-Based Learning. Teachers with 12 to 15 years of experience (mean rank = 538.83) use project-based learning significantly more than teachers with 0 to 3 years of experience (mean rank = 416.71) ($x^2(6) = 16.262$, $p < .05$).

Service Learning. Teachers with more than 23 years of experience (mean rank = 543.14) use service learning significantly more than teachers with 0 to 3 years of experience (mean rank = 409.53). Teachers with 12 to 15 years of experience (mean rank = 538.83) use project-based

learning significantly more than teachers with 0 to 3 years of experience (mean rank = 419.72) ($x^2(6) = 19.737$, $p < .01$).

On-the Job Training. Teachers with 16 to 19 years of experience (mean rank = 534.96) and teachers with more than 23 years of experience (mean rank = 528.75) use on-the-job training significantly more than teachers with 0 to 3 years of experience (mean rank = 405.03 ($x^2(6) = 17.212$, $p < .01$).

Comparative Usage of Strategies by CTE Content Area

The researcher compared the mean ranked scores using the Kruskal-Wallis H test and then a pairwise post hoc test to determine if a significance existed between a teachers' content area and the use of classroom instructional strategy. See the complete data set in Appendix M. The researcher found the following results.

Whole Group Discussion. Health sciences teachers (mean rank = 591.20) use whole group discussion significantly more than engineering and technology teachers (mean rank = 482.03) ($x^2(5) = 12.946$, $p < .05$).

Guided Practice. Business, marketing, and information technology teachers (mean rank = 532.81), family consumer sciences and human services teachers (mean rank = 542.41), engineering and technology teachers (mean rank = 571.08), and skilled technical sciences teachers (mean rank = 621.29) use guided practice significantly more than agriculture teachers (mean rank = 423.85) ($x^2(5) = 26.918$, $p < 01$).

Interactive Lecture. Health sciences teachers (mean rank = 603.38) use interactive lecture significantly more than engineering and technology teachers (mean rank = 467.26) ($x^2(5) = 16.685$, $p < .01$).

Major Writing. Business, marketing, and information technology teachers (mean rank = 548.83), family consumer sciences and human services teachers (mean rank = 565.32), and agriculture teachers (mean rank = 584.43) use major writing significantly more than skilled technical sciences teachers (mean rank = 415.50). Family consumer sciences and human services teachers (mean rank = 565.32), agriculture teachers (mean rank = 584.43), and health sciences teachers (mean rank = 626.30) use major writing significantly more than engineering and technology teachers (mean rank = 475.88) ($x^2(5) = 40.008$, $p < .01$).

Lab Activities. Family consumer sciences and human services teachers (mean rank = 607.47), engineering and technology teachers (mean rank = 649.70), and skilled technical sciences teachers (mean rank = 687.80) use lab activities significantly more than business, marketing, and information technology teachers (mean rank = 387.54). Health sciences teachers (mean rank = 577.46), family consumer sciences and human services teachers (mean rank = 607.47), engineering and technology teachers (mean rank = 649.70), and skilled technical sciences teachers (mean rank = 687.80) use lab activities significantly more than business, marketing, and information technology teachers (mean rank = 387.54). Family consumer sciences and human services teachers (mean rank = 607.47) and skilled technical sciences teachers (mean rank = 687.80) use lab activities significantly more than agriculture teachers (mean rank = 472.47) ($x^2(5) = 150.079$, $p < .01$).

Demonstrations. Health sciences teachers (mean rank = 583.21), engineering and technology teachers (mean rank = 609.67), and skilled technical sciences teachers (mean rank = 707.73) use demonstrations significantly more than agriculture teachers (mean rank = 466.21) and business, marketing, and information technology teachers (mean rank = 477.93). Skilled technical sciences teachers (mean rank = 707.73) use demonstrations significantly more than

family consumer sciences and human services teachers (mean rank = 534.27) and health sciences teachers (mean rank = 583.2) ($x^2(5) = 61.970$, $p < .01$).

Student Presentations. Business, marketing, and information technology teachers (mean rank = 539.45) and agriculture teachers (mean rank = 566.48) use student presentations significantly more than skilled technical sciences teachers (mean rank = 425.92) and family consumer sciences and human services teachers (mean rank = 604.21). Health sciences teachers (mean rank = 609.73) use student presentations significantly more than engineering and technology teachers (mean rank = 492.30) ($x^2(5) = 35.756$, $p < .01$).

Short Paper. Agriculture teachers (mean rank = 560.95), family consumer sciences and human services teachers (mean rank = 574.14), and health sciences teachers (mean rank = 597.57) use short papers significantly more than engineering and technology teachers (mean rank = 443.91). Agriculture teachers (mean rank = 560.95), family consumer sciences and human services teachers (mean rank = 574.14), and health sciences teachers (mean rank = 597.57) use short papers significantly more than skilled technical sciences teachers (mean rank = 448.73). Family consumer sciences and human services teachers (mean rank = 574.14) and health sciences teachers (mean rank = 597.57) use short papers significantly more than business, marketing, and information technology teachers (mean rank = 516.58) ($x^2(5) = 35.911$, $p < .01$).

Student Peer Assessment. Business, marketing, and information technology teachers (mean rank= 481.13) used student peer assessment significantly more than engineering and technology teachers (mean rank = 605.12) and health sciences teachers (mean rank = 624.34). Engineering and technology teachers (mean rank = 605.12) and health sciences teachers (mean rank = 624.34) used student peer assessment significantly more than agriculture teachers (mean rank = 496.48) ($x^2(5) = 32.825$, $p < .01$).

Small Group Discussion. Family consumer sciences and human services teachers (mean rank = 581.35) used small group discussion significantly more than business, marketing, and information technology teachers (mean rank = 497.56) ($x^2(5) = 14.400$, $p < .05$).

Online Discussion. Business, marketing, and information technology teachers (mean rank = 556.53) used online discussion significantly more than agriculture teachers (mean rank = 455.67). Health sciences teachers (mean rank = 614.02) used online discussion significantly more than engineering and technology teachers (mean rank = 503.11) ($x^2(5) = 21.241$, $p < .01$).

Quizzes. Skilled technical sciences teachers (mean rank = 608.14) and health sciences teachers (mean rank = 686.91) use quizzes significantly more than family consumer sciences and human services teachers (mean rank = 487.83). Skilled technical sciences teachers (mean rank = 608.14) use quizzes significantly more than business, marketing, and information technology teachers (mean rank = 506.14). Health sciences teachers (mean rank = 686.91use quizzes significantly more than engineering and technology teachers (mean rank = 514.77) and agriculture teachers (mean rank = 538.42) ($x^2(5) = 46.927$, $p < .01$).

Personal Reflection. Health sciences teachers (mean rank = 570.57) and family consumer sciences and human services teachers (mean rank = 640.20) use personal reflection significantly more than agriculture teachers (mean rank = 443.21). Family consumer sciences and human services teachers (mean rank = 640.20) use personal reflection significantly more than business, marketing, and information technology teachers (mean rank = 484.01), skilled technical sciences teachers (mean rank = 516.12), and engineering and technology teachers (mean rank = 521.78 ($x^2(5) = 52.254$, $p < .01$).

Cooperative Learning. Engineering and technology teachers (mean rank = 547.11), skilled technical sciences teachers (mean rank = 567.83), health sciences teachers (mean rank =

574.55), and family consumer sciences and human services teachers (mean rank = 618.76) use cooperative learning significantly more than business, marketing, and information technology teachers (mean rank = 451.39). Family consumer sciences and human services teachers (mean rank = 618.76) used cooperative learning significantly more than agriculture teachers (mean rank = 504.75) ($x^2(5) = 48.830$, $p < .01$).

Learning Portfolio. Engineering and technology teachers (mean rank = 597.57) use learning portfolios significantly more than agriculture teachers (mean rank = 468.67) ($x^2(5) = 17.181$, $p < .01$).

Student Attitude Survey. Health sciences teachers (mean rank = 599.25) use student attitude survey significantly more than business, marketing, and information technology teachers (mean rank = 497.03) ($x^2(5) = 16.351$, $p < .01$).

Brainstorming. Engineering and technology teachers (mean rank = 559.37) used brainstorming significantly more than agriculture teachers (mean rank = 438.70) ($x^2(5) = 14.788$, $p < .05$).

Asynchronous Online Learning. Family consumer sciences and human services teachers (mean rank = 498.49), engineering and technology teachers (mean rank = 531.77), business, marketing, and information technology teachers (mean rank = 551.32), and health sciences teachers (mean rank = 579.97) use asynchronous online learning significantly more than skilled technical sciences teachers (mean rank = 371.91). Family consumer sciences and human services teachers (mean rank = 498.49), engineering and technology teachers (mean rank =531.77), business, marketing, and information technology teachers (mean rank = 551.32), and health sciences teachers (mean rank = 579.37) use asynchronous online learning significantly more than agriculture teachers (mean rank = 390.51) ($x^2(5) = 54.635$, $p < .01$).

Student Peer Teaching. Family consumer sciences and human services teachers (mean rank = 510.85), health sciences teachers (mean rank = 563.42), skilled technical sciences teachers (mean rank = 618.61), and engineering and technology teachers (mean rank = 560.88) use student peer teaching significantly more than business, marketing, and information technology teachers (mean rank = 422.61). Skilled technical sciences teachers (mean rank = 618.61) use student peer teaching significantly more than family consumer sciences and human services teachers (mean rank = 510.85) ($x^2(5) = 52.183$, $p < .01$).

Review Sessions. Skilled technical sciences teachers (mean rank = 608.28) and health sciences teachers (mean rank = 645.38) use review sessions significantly more than business, marketing, and information technology teachers (mean rank = 457.29). Skilled technical sciences teachers (mean rank = 608.28) use review sessions significantly more than family consumer sciences and human services teachers (mean rank = 496.79) and engineering and technology teachers (mean rank = 560.88). Health sciences teachers (mean rank = 645.38) use review sessions significantly more than agriculture teachers (mean rank = 501.86) and family consumer sciences and human services teachers (mean rank = 496.79) ($x^2(5) = 48.996$, $p < .01$).

Literature Review. Family consumer sciences and human services teachers (mean rank = 519.71), health sciences teachers (mean rank =587.50), and skilled technical sciences teachers (mean rank = 587.50) use literature review significantly more than business, marketing, and information technology teachers (mean rank = 442.93) ($x^2(5) = 33.053$, $p < .01$).

Online/E-Portfolio. Business, marketing, and information technology teachers (mean rank = 528.30) and engineering and technology teachers (mean rank = 549.47) use online/e-portfolio significantly more than agriculture teachers (mean rank = 419.18) ($x^2(5) = 20.134$, $p < .01$).

Case Study. Family consumer sciences and human services teachers (mean rank = 508.43), health sciences teachers (mean rank = 699.17), and business, marketing, and information technology teachers (mean rank = 557.68) use case study significantly more than agriculture teachers (mean rank = 395.36). Business, marketing, and information technology teachers (mean rank = 557.68) and health sciences teachers (mean rank = 699.17) use case study significantly more than skilled technical sciences teachers (mean rank = 417.48). Business, marketing, and information technology teachers (mean rank =557.68) and health sciences teachers (mean rank = 699.17) use case study significantly more than engineering and technology teachers (mean rank = 435.30) and family consumer sciences and human services teachers (mean rank = 508.43) ($x^2(5) = 95.167$, $p < .01$).

Question/Answer. Health sciences teachers (mean rank = 566.19) use question/answer using clickers/personal response systems significantly more than skilled technical sciences teachers (mean rank = 439.36), engineering and technology teachers (mean rank = 446.58), and business, marketing, and information technology teachers (mean rank = 465.17) ($x^2(5) = 17.218$, $p < .01$).

Think/Pair/Share. Family consumer sciences and human services teachers (mean rank (536.71) and health sciences teachers (mean rank = 541.82) use think/pair/share significantly more than skilled technical sciences teachers (mean rank = 429.16), business, marketing, and information technology teachers (mean rank = 436.33), and engineering and technology teachers (mean rank = 439.23) ($x^2(5) = 31.769$, $p < .01$).

Minute Paper. Family consumer sciences and human services teachers (mean rank = 539.06) use minute paper/sentence summary significantly more than engineering and technology teachers (mean rank = 443.61). Family consumer sciences and human services teachers (mean

rank = 539.09) and agriculture teachers (mean rank =540.44) use minute paper/sentence summary significantly more than business, marketing, and information technology teachers (mean rank = 449.93) ($x^2(5) = 24.996$, $p < .01$).

Problem-Based Learning. Skilled technical sciences teachers (mean rank = 543.26) and engineering and technology teachers (mean rank = 625.28) use problem-based learning significantly more than family consumer sciences and human services teachers (mean rank = 434.05). Engineering and technology teachers (mean rank = 625.28) use problem-based learning significantly more than business, marketing, and information technology teachers (mean rank = 486.50), health sciences teachers (mean rank 503.77), and agriculture teachers (mean rank = 470.86) ($x^2(5) = 50.255$, $p < .01$).

Role Play. Family consumer sciences and human services teachers (mean rank = 517.81) and health sciences teachers (mean rank = 679.93) use role play significantly more than skilled technical sciences teachers (mean rank = 397.17). Health sciences teachers (mean rank = 679.93) use role play significantly more than agriculture teachers (mean rank =450.26), business, marketing, and information technology teachers (mean rank = 491.8,1), and family consumer sciences and human services teachers (mean rank = 517.81) ($x^2(5) = 67.976$, $p < .01$).

Games. Business, marketing, and information technology teachers (mean rank = 442.81), agriculture teachers (mean rank = 478.62), family consumer sciences and human services teachers (mean rank = 508.86), and health sciences teachers (mean rank = 548.73) use games significantly more than engineering and technology teachers (mean rank = 327.46). Family consumer sciences and human services teachers (mean rank = 508.86) and health sciences teachers (mean rank = 548.73) use games significantly more than skilled technical sciences teachers (mean rank = 376.52). Health sciences teachers (mean rank = 548.73) use games

significantly more than business, marketing, and information technology teachers (mean rank = 442.81) ($x^2(5) = 67.976$, $p < .01$).

Computer Simulations. Engineering and technology teachers (mean rank = 541.50), health science teachers (mean rank = 507.90), and business, marketing, and information technology teachers (mean rank = 607.90) use computer simulations significantly more than family consumer sciences and human services teachers (mean rank = 410.72). Engineering and technology teachers (mean rank = 541.50) and business, marketing, and information technology teachers (mean rank = 607) used computer simulations significantly more than agriculture teachers (mean rank = 430.15). Business, marketing, and information technology teachers (mean rank = 607.90) use computer simulations significantly more than skilled technical sciences teachers (mean rank = 439.10) and health sciences teachers (mean rank = 507.90) ($x^2(5) = 79.706$, $p < .01$).

Debates. Health sciences teachers (mean rank = 558.71) and agriculture teachers (mean rank = 603.84) use debates significantly more than engineering and technology teachers (mean rank = 426.82). Agriculture teachers (mean rank = 603.84) use debates significantly more than business, marketing, and information technology teachers (mean rank = 480.24) and family consumer sciences and human services teachers (mean rank = 480.38) ($x^2(5) = 79.706$, $p < .01$).

In-Class Informal Writing. Business, marketing, and information technology teachers (mean rank = 368.48), health sciences teachers (mean rank = 542.57), and family consumer sciences and human services teachers (mean rank = 559.73) use in-class informal writing significantly more than skilled technical sciences teachers (mean rank = 368.48). Family consumer sciences and human services teachers (mean rank = 559.73) use in-class informal

writing significantly more than engineering and technology teachers (mean rank = 457.97) ($x^2(5) = 79.706$, $p < .01$).

Student-Generated Quizzes. Agriculture teachers (mean rank = 574.83) and health sciences teachers (mean rank = 619.70) use student-generated quizzes significantly more than skilled technical sciences teachers (mean rank = 427.06). Agriculture teachers (mean rank = 574.83) and health sciences teachers (mean rank = 619.70) use student-generated quizzes significantly more than business, marketing, and information technology teachers (ranked mean = 468.90). Health sciences teachers (mean rank = 619.70) use student-generated quizzes significantly more than engineering and technology teachers (mean rank = 473.92) and family consumer sciences and human services teachers (mean rank = 523.01) ($x^2(5) = 42.057$, $p < .01$).

Concept Map. Engineering and technology teachers (mean rank = 497.09), family consumer sciences and human services teachers (mean rank = 532), agriculture teachers (mean rank = 538.79), and health sciences teachers (mean rank = 632.01) use concept map significantly more than skilled technical sciences teachers (mean rank = 386.93). Family consumer sciences and human services teachers (mean rank = 532.00) and health sciences teachers (mean rank = 632.01) use concept map significantly more than business, marketing, and information technology teachers (mean rank = 457.06). Health sciences teachers (mean rank = 632.01) use concept map significantly more than engineering and technology teachers (mean rank = 497.09) and family consumer sciences and human services teachers (mean rank = 532.00) ($x^2(5) = 52.079$, $p < .01$).

Film/Video. Family consumer sciences and human services teachers (mean rank = 555.78) use film/video significantly more than business, marketing, and information technology teachers (ranked mean = 472.33) ($x^2(5) = 19.288$, $p < .01$).

Annotated Bibliography. Engineering and technology teachers (mean rank = 511.66), health sciences teachers (mean rank = 523.82), family consumer sciences and human services teachers (mean rank = 535.76), and agriculture teachers (mean rank = 543.16) use annotated bibliography significantly more than skilled technical sciences teachers (mean rank = 428.55). Family consumer sciences and human services teachers (mean rank = 535.76) and agriculture teachers (mean rank = 543.16) use annotated bibliography significantly more than business, marketing, and information technology teachers (mean rank = 467.65) ($x^2(5) = 31.751$, $p < .01$).

Self-Assessment. Family consumer sciences and human services teachers (mean rank = 570.26) use self-assessment significantly more than agriculture teachers (mean rank = 432.15) and business, marketing, and information technology teachers (mean rank = 456.22) ($x^2(5) = 31.323$, $p < .01$).

Field Trips. Family consumer sciences and human services teachers (mean rank = 500.31), engineering and technology teachers (mean rank = 509.56), skilled technical sciences teachers (mean rank = 528.92), health sciences teachers (mean rank = 570.85), and agriculture teachers (mean rank = 612.05) use field trips significantly more than business, marketing, and information technology teachers (mean rank = 429.55). Agriculture teachers (mean rank = 612.05) use field trips significantly more than family consumer sciences and human services teachers (mean rank = 500.31) and engineering and technology teachers (mean rank = 509.56)($x^2(5) = 47.639$, $p < .01$).

Service Learning. Family consumer sciences and human services teachers (mean rank = 558.57) and agriculture teachers (mean rank = 570.74) use service learning significantly more than business, marketing, and information technology teachers (mean rank = 427.85). Family consumer sciences and human services teachers (mean rank = 558.57), agriculture teachers

(mean rank = 570.74), and health sciences teachers (mean rank = 583.82) use service learning significantly more than engineering and technology teachers (mean rank = 449.99) ($x^2(5) = 55.436$, $p < .01$).

Online Discussion. Family consumer sciences and human services teachers (mean rank = 499.28), health sciences teachers (mean rank = 564.05), and business, marketing, and information technology teachers (mean rank = 554.37) use online discussion significantly more than agriculture teachers (mean rank = 403.54). Business, marketing, and information technology teachers (mean rank = 554.37) and health sciences teachers (mean rank = 564.05) use online discussion significantly more than skilled technical sciences teachers (mean rank = 437.76) ($x^2(5) = 37.721$, $p < .01$).

Online Formative Quizzes. Business, marketing, and information technology teachers (mean rank = 535.89) and health sciences teachers (mean rank = 636.27) use online formative quizzes significantly more than skilled technical sciences teachers (mean rank = 429.26). Health sciences teachers (mean rank = 636.37) use online formative quizzes significantly more than agriculture teachers (mean rank = 460.75), engineering and technology teachers (mean rank = 466.46), family consumer sciences and human services teachers (mean rank = 501.64), and business, marketing, and information technology teachers (mean rank = 535) ($x^2(5) = 39.288$, $p < .01$).

Online Collaborative Projects. Agriculture teachers (mean rank = 481.70), engineering and technology teachers (mean rank = 498.39), health sciences teachers (mean rank = 518.93), family consumer sciences and human services teachers (mean rank = 522.62), and business, marketing, and information technology teachers (mean rank = 555.44) use online collaborative

projects significantly more than skilled technical sciences teachers (mean rank = 337.28) ($x^2(5) = 44.471$, $p < .01$).

Synchronous Online Lecture. Business, marketing, and information technology teacher (mean rank = 532.26) and health sciences teachers (mean rank = 576.85) use synchronous online lecture significantly more than skilled technical sciences teachers (mean rank = 421.44) ($x^2(5) = 20.439$, $p < .01$).

Computer-Based Learning Exercises/Games Simulations. Health sciences teachers (mean rank = 579.31) and business, marketing, and information technology teachers (mean rank = 593.19) use computer-based learning exercise/games simulations significantly more than skilled technical sciences teachers (mean rank = 409.04). Health sciences teachers (mean rank = 579.31) and business, marketing, and information technology teachers (mean rank = 593.19) use computer-based learning exercises/games simulations significantly more than agriculture teachers (mean rank = 593.19). Health sciences teachers (mean rank = 579.31) and business, marketing, and information technology teachers (mean rank = 593.16) use computer-based learning exercises/games simulations significantly more than family consumer sciences and human services teachers (mean rank = 460.48). Business, marketing, and information technology teachers (mean rank = 593.19) use computer-based learning exercises/games simulations significantly more than engineering and technology teachers (mean rank = 505.41) ($x^2(5) = 60.958$, $p < .01$).

Project-Based Learning. Business, marketing, and information technology teachers (mean rank = 508.90) and engineering and technology teachers (mean rank = 624.55) use project-based learning significantly more than health sciences teachers (mean rank = 410.04). Engineering and technology teachers (mean rank = 624.55) use project-based learning

significantly more than family consumer sciences and human services teachers (mean rank = 473.30), agriculture teachers (mean rank = 477.45), and business, marketing, and information technology teachers (mean rank = 508) ($x^2(5) = 45.964$, $p < .01$).

On-the-Job Training. Skilled technical sciences teachers (mean rank = 659.16) use on-the-job training significantly more than business, marketing, and information technology teachers (mean rank = 411.56), engineering and technology teachers (mean rank =504.60), and family consumer sciences and human services teachers (mean rank = 511.81). Engineering and technology teachers (mean rank =504.60), family consumer sciences and human services teachers (mean rank = 511.81), and agriculture teachers use on-the-job training significantly more than business, marketing, and information technology teachers (mean rank = 411.56) ($x^2(5) = 66.070$, $p < .01$).

Work-Based Learning. Skilled technical sciences teachers (mean rank = 597.39) and agriculture teachers (mean rank = 704.61) use work-based learning significantly more than business, marketing, and information technology teachers (mean rank = 431.00) and than family consumer sciences and human services teachers (mean rank = 463.61). Agriculture teachers (mean rank = 704.61) use work-based learning significantly more than family consumer sciences and human services teachers (mean rank = 463.61) and health sciences teachers (mean rank = 517.11) ($x^2(5) =89.766$, $p < .01$).

Comparative Usage of Strategies by Type of School

The researcher investigated if there was a significant difference between the type of school the teacher was employed at (see Table 5) and the classroom instructional strategies they used. See the complete data set in Appendix N. The research suggests the following differences in instructional methods used by teachers at different types of schools.

Guided Practice. Teachers employed in a comprehensive high school (mean rank = 511.33) use guided practice significantly more than teachers in an area career center (mean rank = 581.42) ($x^2(4) = 11.526$, $p < .05$).

Major writing. Teachers employed in an area career center (mean rank = 521.88) and teachers employed in a comprehensive high school (mean rank = 531.99) use major writing significantly more than teachers employed at a four-year university (mean rank = 865.67). Teachers employed at a four-year university (mean rank = 865.67) used major writing significantly more than teachers employed at a community college (mean rank = 574.07) ($x^2(4) = 31.334$, $p < .01$).

Lab Activities. Teachers employed at an area career center (mean rank = 651.06) use lab activities significantly more than teachers employed at a four-year university (mean rank = 432.45). Teachers employed at a community college (mean rank = 631.84) use lab activities significantly more than teachers employed at a four-year university (mean rank = 432.45) and teachers employed in a comprehensive high school (mean rank = 480.14) ($x^2(4) = 75.144$, $p < .01$).

Demonstrations. Teachers employed at an area career center (mean rank = 625.48) use demonstrations significantly more than teachers employed at a comprehensive high school (mean rank = 502.45) ($x^2(4) = 40.213$, $p < .01$).

Student Presentations. Teachers employed at a comprehensive high school (mean rank = 544.66) use student presentations significantly more than teachers employed at an area career center (mean rank = 528.81) ($x^2(4) = 25.409$, $p < .01$).

Short Paper. Teachers employed at a four-year university (mean rank = 739.93) use short paper significantly more than teachers employed at a comprehensive high school (mean

rank = 511.60) and teachers employed at an area career center (mean rank = 512.80) ($x^2(4) = 21.807$, $p < .01$).

Student Peer Assessment. Teachers employed at a four-year university (mean rank = 756.70) use student peer assessment significantly more than teachers employed at a comprehensive high school (mean rank = 520.65) and teachers employed at a community college (mean rank = 497.28) ($x^2(4) = 26.112$, $p < .01$).

Small Group Discussion. Teachers employed at a four-year university (mean rank = 734.77) use small group discussion significantly more than teachers employed at a comprehensive high school (mean rank =519.76) ($x^2(4) = 14.994$, $p < .01$).

Quizzes. Teachers employed at a community college (mean rank = 645.20) use quizzes significantly more than teachers employed at a comprehensive high school (mean rank = 513.00) ($x^2(4) = 14.714$, $p < .01$).

Personal Reflection. Teachers employed at a four-year university (mean rank = 759.70) use personal reflection significantly more than teachers employed at a comprehensive high school (mean rank = 524.86) and teachers employed at an area career center (mean rank = 522.89) ($x^2(4) = 12.852$, $p < .01$).

Learning Portfolio. Teachers employed at an area career center (mean rank = 589.41) use learning portfolio significantly more than teachers employed at a comprehensive high school (mean rank = 507.59) ($x^2(4) = 19.894$, $p < .01$).

Student Peer Teaching. Teachers employed at an area career center (mean rank = 580.57) use student peer teaching significantly more than teachers employed at a comprehensive high school (mean rank = 471.92) ($x^2(4) = 31.717$, $p < .01$).

Review Sessions. Teachers employed at an area career center (mean rank = 550.39) use review sessions significantly more than teachers employed at a comprehensive high school (mean rank = 487) ($x^2(4) = 10.720$, $p < .01$).

Literature Review. Teachers employed at an area career center (mean rank = 588.38) use review sessions significantly more than teachers employed at a comprehensive high school (mean rank = 459.06) ($x^2(4) = 47.633$, $p < .01$).

Case Study. Teachers employed at a community college (mean rank = 574.55) used case study significantly more than teachers employed at a comprehensive high school (mean rank = 492.09) ($x^2(4) = 20.201$, $p < .01$).

Lecture. Teachers employed at a four-year university (mean rank = 315.75) use lecture significantly more than teachers employed at a comprehensive high school (mean rank = 291.78) ($x^2(4) = 16.357$, $p < .01$).

Think/Pair/Share. Teachers employed at a four-year university (mean rank = 635.32) use think/pair/share significantly more than teachers employed at a comprehensive high school (mean rank = 477.32) ($x^2(4) = 12.993$, $p < .05$).

Games. Teachers employed at a comprehensive high school (mean rank = 457.30) use games significantly more than teachers employed at an area career center (mean rank = 440.09) and teachers employed at a community college (mean rank = 255.18) ($x^2(4) = 26.422$, $p < .01$).

Original Research Proposal. Teachers employed at a four-year university (mean rank = 688.45) and teachers employed at a comprehensive high school (mean rank = 497.66) use

original research proposal significantly more than teachers employed at a community college (mean rank = 470.90) ($x^2(4) = 11.387$, $p < .05$).

Concept Maps/Mind Maps. Teachers employed at a four-year university (mean rank = 637.44) use concept/mind maps significantly more than teachers employed at a community college (mean rank = 407.54) ($x^2(4) = 16.092$, $p < .01$).

Film/Video. Teachers employed at a four-year university (mean rank = 691.71) use film/video significantly more than teachers employed at a community college (mean rank = 461.17) and teachers employed at an area career center (mean rank = 514.12) ($x^2(4) = 10.465$, $p < .05$).

Annotated Bibliography. Teachers employed at a four-year university (mean rank = 631.45) use annotated bibliography significantly more than teachers employed at a community college (mean rank = 455.78) and teachers employed at an area career center (mean rank = 488.75) ($x^2(4) = 10.544$, $p < .05$).

Service Learning. Teachers employed at a four-year university (mean rank = 535.59) and teachers employed at an area career center (mean rank = 550.39) use service-learning significantly more than teachers employed at a community college (mean rank = 382.20) ($x^2(4) = 25.815$, $p < .01$).

Video Creation. Teachers employed at four-year university (mean rank = 658.79) use video creation significantly more than teachers employed at an area career center (mean rank = 464.51) ($x^2(4) = 13.874$, $p < .01$).

Online Discussion. Teachers employed at a four-year university (mean rank = 716.33) use online discussion significantly more than teachers employed at a community college (mean

rank = 593.48) and teachers employed at an area career center (mean rank = 498.87) ($x^2(4) = 19.923$, $p < .01$).

Online Collaborative Projects. Teachers employed at a four-year university (mean rank = 691.16) use online collaborative projects significantly more than teachers employed at a community college (mean rank = 458.01) and teachers employed at an area career center (mean rank = 461.59) ($x^2(4) = 17.232$, $p < .01$).

On-the-Job Training. Teachers employed at an area career center (mean rank = 632.00) and teachers employed at a four-year university (mean rank = 646.14) use on-the-job training significantly more than teachers employed at a comprehensive high school (mean rank = 444.90) ($x^2(4) = 94.970$, $p < .01$).

Work-Based Learning. Teachers employed at an area career center (mean rank = 590.79) use work-based learning significantly more than teachers employed at a comprehensive high school (mean rank = 464.27) ($x^2(4) = 41.858$, $p < .01$).

Research Question 3 Data

Research Question 3 was "Did Covid-19 have an effect on CTE teachers' use of classroom instructional strategies?" Survey questions 19 and 20 were used to collect data addressing this question. Participants were asked to indicate how Covid-19 affected the classroom instructional strategies that they selected in questions 10 through 18. The 989 responses ranged from 1 ("No affect) to 5 ("Always affected"). The research suggested that Covid-19 did not have any significant effect on classroom instructional strategies on teachers of all certification routes. See the complete data set in Appendix O.

Effect of Covid-19 by Region

The research suggests that Covid-19 significantly affected teachers in the Pacific (mean rank = 525.76) and the Northeast regions (mean rank = 566.55) more than teachers in the Midwest (mean rank = 460.54) ($x^2(3) = 14.180$, $p < .01$).

Effect of Covid-19 by Subject Area

The research suggests that Covid-19 affected classroom instructional strategies used by family consumer sciences and human services teachers (mean rank = 541.91), engineering and technology teachers (mean rank = 550.62), and health sciences teachers (mean rank = 602) significantly more than it affected business, marketing, and information technology teachers (mean rank = 423.16). The research suggested that Covid-19 significantly affected classroom instructional strategies used by health sciences teachers (mean rank = 602.18) more than it affected agriculture teachers (mean rank = 459.81) ($x^2(5 = 51.298$, $p < .01$).

Other Covid Findings

The researcher further examined the data to find that business, marketing, and information technology teachers (ranked means = 423.16) were less affected by Covid-19 than teachers of any of the other subject areas and that health sciences teachers (ranked means = 602.18) were impacted the most by Covid-19 ($x^2(5 = 51.298$, $p < .01$). The Northeast region (566.55) was affected the most by Covid-19, while the Midwest region (460.54) was the least affected by Covid-19. No significant differences were found between methods of certification and the effect of Covid-19 and the use of classroom instructional strategies.

Summary

The research investigated the signature pedagogies of CTE teachers in the United States and determined whether a teacher's demographics affected the usage of classroom instructional

strategies and if Covid-19 had any effect on the classroom instructional strategies. Of the 209,700 teachers (U.S. Bureau of Labor Statistics, 2020) employed during the 2019/20 school year in the United States, 1,106 responded to the survey (n = 1106, N = 209,700) and the results of the survey may be generalizable to the population. The study was guided by Research Question 1, Research Question 2, and Research Question 3.

The survey participants provided demographic data that included geographical setting, region of the United States, type of teaching certification, years of teaching experience, CTE subject area taught, and if they had someone of significance in their life who was a teacher. The researcher analyzed these data by using a Kruskal-Wallis H test that compared the frequency of classroom instructional strategies and the various demographic data. If the Kruskal-Wallis H test indicated a potential significant difference, then a pairwise comparison post hoc test was used to identify if a significant difference exists and to what extent the difference is significant. The data suggested that usage only of the classroom instructional strategy usage of games was significantly different between teachers with a person of significance in their life who was a teacher and teachers without someone of significant difference in their life who was a teacher. The data also suggested a significant difference in classroom instructional strategies used between some teachers with different years of experience, some teachers of subject areas, teachers in different regions, teachers with different routes to certification, and teachers in different school settings. The data suggested that Covid-19 may have had an effect on classroom instructional strategies used by teachers in different regions of the United States and on teachers of different subject areas. Chapter IV presented the significant differences between data and the complete data can be found in Appendices F through N.

Chapter V: Conclusions and Discussion

Overview

The purpose of this study was to investigate the classroom instructional strategies currently being used by career and technical education (CTE) teachers and to determine if specific demographics impacted the strategies used in the classroom. An additional purpose of this study was to determine if there has been any impact on the classroom instructional strategies caused by moves to online learning in response to Covid-19. The results of this study could reveal a signature pedagogy of CTE.

Chapter V presents conclusions drawn from the findings in Chapter IV. This chapter will include conclusions, practical significance, P-20 implications, and limitations of the study. This chapter also presents recommendations for future research from the researcher.

Conclusions

Summary of Research Question 1

Signature pedagogy. The data from the study suggests that three signature pedagogies for CTE are questioning, guided practice, and demonstrations. The results from survey question 10-16 were used to determine the signature pedagogies in CTE. The teacher's answers to these questions indicated how often they used each strategy. Values were assigned to the survey responses. A value of six points was assigned to "Always," five points to "Almost Always," four points to "Frequently," three points to "Occasionally," two points to "Rarely," and one point to "Never." Using the Likert-type data, the means of the results were analyzing to determine the three signature pedagogies of CTE. Sullivan and Artino (2013) stated that using the means of the is data is "recommended, particularly when researchers are attempting to measure less concrete concepts" (p. 1). Harpe (2015) stated that that the arithmetic mean is recommended for analyzing

the interval data. For the purpose of this study, the arithmetic mean of the Likert-type responses were used to determine the signature pedagogies of CTE.

Survey questions 10 through 17 provided data for Research Question 1. Survey question 17 asked participants to choose their three most-used classroom instructional strategies from a list of 54 strategies. By comparing the percentage of participants who used the strategy, the researcher determined that the three most-used strategies by frequency were interactive lecture (32.81%), lab activities (28.32%), and project-based learning (28.22%).

Relations of Conclusions to Other Research

Shulman

This study has indicated that significant differences exist for all three research questions. Shulman (2005b) stated that investigating how teachers teach will impact how future educators will teach. Shulman further indicated that the investigation of teachers' pedagogies would impact students' ability to be productive citizens. Shulman (2005b) indicated that investigating teaching strategies from different disciplines could improve "teaching and learning in professions for which they are not now signatures (p. 58). This study reaffirms the potential impacts of investigating, reflecting, and improving how teachers teach to improve the profession of teaching. The researcher thinks that by determining the most and least used classroom strategies by subject area, this study may lead to improving the quality of teaching in all subject areas.

Fletcher and Djajalaksana

This study reaffirmed the data in Fletcher and Djajalaksana (2014a) that significant differences exist between teaching strategies and higher education teachers' subject area. Fletcher and Djajalaksana (2014b) determined that P-12 teachers used lab activities, guided practice, and demonstrations the most often, while this study determined that questioning, guided

practice, lab activities, and whole group discussion were the most used. When classroom instructional strategy usage was further investigated by means, the three most-used classroom instructional strategies were lecture, lab activities, and project-based learning. As Fletcher and Djajalaksana's two studies (2014a, 2014b) investigated CTE teachers in different settings, this study also discovered that a CTE teacher's setting may affect their usage of classroom instructional strategies. This study further examined the relationship between teacher demographics and the effect of Covid-19 on classroom instructional strategy usage and discovered that a CTE teacher's setting may affect the choice of classroom instructional strategies. The researcher found that that Covid-19 had a significant impact on CTE teachers' classroom instructional strategy depending on the region they were from and the subject area they taught. The researcher thinks that identifying which regions are affected the most by Covid-19 could help states and school districts be better prepared for the next pandemic.

Walker and Atkins.

This study furthered the research by Walker and Atkins (2021) investigating CTE classroom instructional strategies. Walker and Atkins (2021) recommended further investigation with a larger population to determine the signature pedagogy for CTE. Walker and Atkins (2021) found that problem-based learning, project-based learning, and on-the-job training were the preferred classroom strategies while this study determined that questioning, guided practice, and lab activities were the three most-used classroom strategies. The researcher thinks that the data from Walker and Atkins (2021) was limited because it only surveyed Missouri teachers. This study was a nationwide study of CTE teachers and is more reliable than Walker and Atkins (2021).

Discussion

Teacher Demographic Data

The data collected and analyzed for this study suggest that demographics have an impact on classroom instructional strategies used by CTE instructors in their classrooms. Data was collected 1,106 participants from 48 out of 50 states, with the largest data set identifying themselves as being from the state of Missouri. Participants were grouped into regions with the Midwest having the largest participation.

Participants' Region. Participants were grouped into regions, with the Midwest region having the largest number of participants and the Pacific region having the least number of participants. The largest data set of participating CTE teachers identified as teaching in the state of Missouri. Three respondents indicated they were unsure of which state they were teaching in and eight preferred not to answer the questions. Over half of the survey participants identified as teaching in a rural setting. The number of participants responding by geographical area may have been impacted by the state associations that forwarded the survey and which state CTE administration association forwarded this research. The number of associations that forwarded the survey is unknown. A larger sample size could affect the results of this study.

Participants' Type of School. The survey participants indicated what type of school they were teaching in. Over 60% identified they were teaching in a comprehensive high school. The researcher found this to be a high percentage of teachers employed in a comprehensive high school, compared to the 26.2% who indicated they were employed in an area career center. The researcher thinks this may have been because the National Association of High School Principals forwarded the survey to their members. Comprehensive high school teachers would have an administrator that could have been a member of the National Association of High School

Principals while area career center teacher would have a director that could be a member of their state's directors' association, which might have been less likely to forward the survey. The researcher thinks that higher education teachers did not have a high number participating because their administration may not have received the survey to forward to staff. The 29 participants that indicated they were not sure what type of school they were teaching in may have had an impact on the results of the data analysis.

Teacher Content Areas Represented. The survey participants indicated the subject area they were teaching in. All subject areas were represented by the survey participants. Of the survey participants, the largest subject area indicated was business, marketing, and information technology with over 30.9%, and skilled technical sciences teachers were the least represented with 22.4%. The researcher thinks this may be due to business, marketing, and information technology teachers having a greater access to technology in the classroom. The research was conducted in March of 2020 when some schools were closed. Potentially, business, marketing, and information technology **t**eachers may have had more access to the internet during the study than teachers in other subject areas.

Certification Types Represented. The survey participants indicated their route to achieving teacher certification. The traditional method with a four-year university with a teaching component was the largest group represented with 51.4%. The career education certification method: traditional CTE coursework was the second largest group of teachers represented with 20.8%. The researcher thinks that the large number of participants with a traditional method with a four-year university with a teaching component is consistent with the number of teachers represented from a comprehensive high school. Comprehensive high schools typically require a traditional method with a four-year university with a teaching component as a

prerequisite for employment**,** while area career centers often recruit individuals with industry experience who pursue the career education certification method: traditional CTE coursework.

Respondents' Years of Experience. Survey participant responses indicate that largest group of teachers represented had over 23 years of teaching experience. The U.S**.** Department of Education (2020) reported that in the 2017/18 school year 40% of all teachers had between 10 and 20 years of experience and 23% of all teachers had over 20 years of experience. The researcher found that the teachers participating in this study had years of experience that closely align with the national averages. The survey participants indicating they have a person of significance in their life who was a teacher was 61.60%, while the Walker and Atkins (2021) survey participants indicated that only 47.75% had a person of significance in their life who was a teacher. The researcher thinks that the higher percentage of participants in this study with a 2021traditional route with a four-year university and teaching component than other routes to teaching certification has affected this data. The researcher also thinks that students are more likely to go to a four-year university after high school if they have someone of significance in their life who was a teacher. Determining this potential cause and effect could determine recruiting strategies for four-year universities, who becomes teachers, and what classroom instructional strategies they use after they become certified.

Research Question 1

The researcher examined the question of what are the potential signature pedagogies used by CTE teachers in their classrooms; the participants were required to indicate how often they used each of the strategies listed. The results provided data which was assigned values which ranged from 6 ("Always") to a 1 ("Never").

Most-Used Classroom Strategies. This data shows that most-used classroom instructional strategies by frequency were interactive lecture, lab activities, and project-based learning. Calculating the means of this data suggests that the signature strategies for CTE are questioning, guided practice, and demonstrations. This study shows that significant differences exist in classroom strategy use and the researcher thinks this is because of the larger percentage of comprehensive high school teachers who participated and their classroom setting. The researcher has observed one potential reason for the variances is that CTE coursework requires students to participate in hands-on learning to prepare them for a career in that subject area. Although Koedel et al. (2015) stated that the CTE teacher preparation program does not have a significant effect on K-12 teacher outcomes, the researcher thinks that the CTE certification requirements may affect the classroom instructional strategies used by the CTE teacher. The researcher thinks this may allow school administrators to provide a higher quality differentiated professional development based on the new teachers' method of certification. The researcher also found a pattern that none of these strategies require Internet connection.

Least-Used Classroom Strategies. This data also suggested that the least-used instructional strategies were original research proposal, student generated quiz/exams, minute paper/sentence summary, and annotated bibliography/webliography. This data also suggests that the least-used instructional strategies through a pooled frequency were literature review, participating in social networking, and annotated bibliography. The researcher found the data suggests that literacy is not a critical classroom strategy of CTE. Hyslop (2010) indicated that secondary level literacy instruction does not connect to post-secondary careers, but targets college preparation requirements. The ACTE (2009) stated that secondary teachers may not be properly prepared to teach literacy in their classrooms. The researcher thinks that two possible

reasons for literacy not being a critical component are the hands-on nature of CTE careers, and that high-quality professional development regarding literacy is not provided to CTE instructors by school districts.

Strategies by Region. This data suggested that teachers from different regions of the United States use different classroom instructional strategies. Participants from all regions indicated that project-based learning was one of their top three strategies**.** After further examination of the data, the researcher identified two trends.

***Trends*.** One trend of the most-used CTE classroom instructional strategies is that they do not require use of the Internet. The researcher questions whether this may be related to the issue of access to the Internet. The Federal Communications Commission (2021) stated that 97% of people living in urban areas have access to high-speed Internet, but access falls to 65% among people living in rural areas, which means that over 30 million Americans do not have access to the Internet. The researcher thinks that the participants' choice of strategies that do not require Internet access is related to the fact that a high percentage of respondents indicated that they teach in rural areas, and because rural areas are more likely to lack high-speed Internet access, school districts may not be able to provide Internet access and/or devices for their classrooms. The researcher also speculates that some school districts may restrict online resources that teachers may embed in their classroom instructional strategies.

A second trend indicated by the data could be variances in classroom instructional strategies used may be due to the differences in the CTE curriculum. Hyslop (2010) stated that the reading levels of CTE literacy materials were often higher than the reading levels of the typical student. The researcher thinks that CTE teachers may not emphasize English Language Arts (ELA) in their curriculum because they were not trained to implement ELA classroom

instructional strategies or because the teacher's choice of curriculum may require higher reading proficiency, and this may change the teacher's choice of instructional strategies by subject area.

Strategies by Subject Area. The study shows that differences in instructional strategy usage by subject area. When analyzing the survey data, the researcher noticed that questioning was the most used by agriculture teachers, business marketing, and information technology teachers, and health sciences teachers. In addition, questioning was the second most-used strategy by family consumer sciences and human services teachers, and the third most-used strategy by skilled technical sciences teachers. The researcher thinks the differences in strategy by subject area exist because of the teacher-student interactions. Marzano et al. (2001) indicated the questioning has a high impact on student learning. Based on observations, the researcher thinks that classroom teachers create interest in the curriculum, increasing student engagement, and creating student relationships by using the questioning classroom instructional strategy. In addition, the researcher thinks that the questioning strategy is easier to implement as it takes less preparation than hands-on learning. The researcher thinks that further investigation into why teachers use questioning should occur.

Strategies by Region. The study shows that difference exist in instructional strategy usage by where the teacher is located in the United States. The researcher discovered that the interactive lecture was the number one strategy used in the South, Midwest, and Pacific regions, while it was the third most-used in the Northeast. The researcher thinks that the differences may exist because of the nature of CTE curriculum requires some academic learning before hands-on learning can successfully occur. The researcher has observed several CTE classroom where hands-on, project-based, and problem-based learning is preceded by interactive lecture by the CTE teacher. The researcher also thinks the differences may exist because of the varied

coursework rigor required for CTE teacher certification. The coursework might vary state to state in rigor according to state course requirements. Subject certification methods are set by each state and vary from state to state and could affect the pedagogies that teacher use to ensure they are meeting state standards for their courses. Some of the higher education institutions offering teacher preparation courses may vary in rigor according to their accreditation body. Universities may choose from one of the six regional accreditation body, a national accreditation body, and/or one of the two national teacher preparation programs (Will, 2019) for their teacher preparation program. Edsmart (2021) stated that regionally accredited institutions are more academically oriented, and some nationally accredited institutions do not have the same strict standard of faculty and resources. The United States is divided into six regions for regional accreditation by commissions (Council for Higher Education Accreditation, 2021). Since each accreditation commission has different standards, the researcher would propose that this would affect the certification methods identified, as participants were from across the United States. The researcher thinks that the difference in teacher preparation program certification requirements could create differences in programs regionally. The regional differences could be a factor in some of the data differences from the survey, as the survey was distributed nationally. The data does not present what institution participants received their coursework from.

Lab Activities. The study shows that lab activities were in the top three classroom instructional strategies used in all CTE disciplines except for business, marketing, and information technology. The researcher has observed that CTE classrooms other than business, marketing and information technology often have a separate area of a room designated for labs, and the curriculum for business, marketing, and information technology often does not include teachers conducting labs. The researcher thinks that the design of the room or how the room is

built might be a reason for the differences in instructional strategy usage by subject area. The building design may have an impact on a teacher's usage of classroom instructional strategies.

Strategy by Type of School. The study shows that the top three classroom instructional strategies used varied by the type of school the teacher indicated they were teaching in. Role play appeared in the top three strategies used in all settings except for area career center. The researcher thinks that role play may be emphasized differently in different school settings. Secondary education teachers have more classroom time with students to implement role play than post-secondary teachers. The researcher also discovered that project-based learning is one of the top three most-used strategy by CTE teachers in all settings except at a four-year university. The researcher thinks that teachers at a four-year university may have different course objectives than teachers at the other settings. The researcher thinks that four-year university teachers may have less seat time with students than the other settings and may not have time to implement project-based learning in their class time available. Research stated that higher education teacher's main instructional strategy was lecture (Wurdinger, 2021).

Unexpected Findings. An unexpected finding from the data was that the three most-used classroom instructional strategies by frequency are not the same as the strategies indicated by the mean of the participant's data on the top three strategies used. The researcher thinks that one reason for the differences could be the participants' lack understanding of each type of strategy. The researcher also thinks that a second reason could be that participants may have had difficulty choosing from such a long list of strategies. A third reason could be that the strategies were not grouped by type, which could have made it harder for participants to respond. A fourth reason could be lack of experience and/or knowledge of all the strategies listed or a lack of resources to implement them by teachers and school districts across the nation. Bruno et al. (2019) indicated

that new teachers often begin their careers in high poverty institutions. The research ponders if the teachers with less experience might not have access to resources needed to understand or implement some of the strategies participants were asked to choose from. As teachers across the country have different routes to certification, the knowledge of classroom instructional strategies may vary. A lack of knowledge about each strategy may create varied responses.

Research Question 2

Research Question 2 examined if a teacher's having a person of significance in their life impacted the classroom instructional strategies used.

Person of Significance. The study shows that a significant difference exists in the use of games by teachers with someone of significance and teachers without someone of significance in their life. The researcher thinks the difference may exist because the person of significance who was a teacher played games with the current teacher when they were younger. The researcher also thinks the possibility may exist that the significant person who was a teacher valued spending time with the future teacher through playing games or had a significant impact on the future teacher's career goal when playing games together. Further research will need to be conducted to determine if having a teacher having a person of significance who was a teacher has any impact on student outcomes.

Certification Method. The study shows that significant differences of classroom instructional strategy usage exist between teachers with different methods of certification. The largest number of significant differences between methods of certification are between teachers with career education certification method: traditional CTE coursework and teacher***s*** with a traditional method of certification. The research suggests that classroom instructional strategies are not used at the same frequency by any of the different routes to CTE teacher certification.

The researcher thinks that differences in methods of certification may be the reason for the differences in strategies used. The college course requirements or the work experiences for teachers with career education certification method: traditional CTE coursework are significantly different than the course requirements for other methods. The research also thinks that the student teaching component of the traditional method may impact a teacher's choice of instructional strategies because the experience of being in a classroom with an experienced teacher may impact the strategies the teacher will use. The coursework and experiences required for each method may impact which strategies the teacher uses in their classroom. The researcher suggest**s** further investigation into why the significant differences exist.

Years of Experience. The study shows that a difference exists in the use of several classroom instructional strategies based on teachers**'** year**s** of experience. The researcher identified a trend of significance in the use of strategies among teachers with more years of experience and teachers with less years of experience. Teachers with 23 or more years of experience use learning portfolio, major writing, guided practice, service learning, problem solving, field trip, and on-the-job experience significantly more than teachers with fewer years of experience.

The researcher thinks that the classroom instructional strategies that the teachers with more than 23 years use involve high depth of knowledge levels and may have been learned through their own on-the-job experience or professional development opportunities during their career. Kini and Podolsky (2016) indicated that teacher effectiveness increases with experience. The researcher thinks that a more experienced teacher might not use the same teaching strategies as a younger, less-experienced teacher because of their own classroom experiences. Teachers with 0 to 3 years of experience used all the classroom instructional strategies less than at least

one other group of teachers by different years of experience. The researcher thinks that most of the strategies require preplanning and outside resources, and that a teacher with less years of experience may not have yet gained the knowledge or experience to implement those strategies. The researcher thinks that a younger teacher having an older, more-experienced teacher as a mentor or a co-teacher might influence the teaching strategies of the younger, less-experienced teacher.

The Effects of Covid 19

Covid -19 caused prolonged school closures due to safety concerns for students and staff. Hoffman and Miller (2020) stated that Covid-19 affected teachers, food service workers, students, and other building staff. This data indicates that Covid-19 had a significant impact on teacher strategy usage by region of the United States and the subject area taught,

Effects on Strategies Used by Region. The study showed that differences exist in instructional strategy usage between regions of the United States during the Covid-19 pandemic. The study showed that significantly more teachers in the Northeast and Pacific regions indicated that their usage of classroom instructional strategies was affected by Covid 19 than did teachers in the South and Midwest regions. Most schools closed for the first time the week of March 16, 2020, with permanent closure for the 2019/2020 school year ranging from March 17 in Kansas to May 6, 2020. Reopening of schools for the 2020/21 school year varied by date depending on the modality, state, and school district. The researcher thinks Covid-19 affected regions differently based on the severity of the outbreaks in the region. The coastal regions of the United States were affected by Covid-19 more than the Midwest and the South regions. The researcher thinks the timing of the survey may have affected the participants' responses and acknowledges that at the time of the survey dissemination not all school were back in seat.

The researcher thinks that the rate of response and instructional strategy usage was impacted by Covid-19. Some teachers did not have Internet access to participate because they were not allowed to be at school. The researcher thinks that social distancing and Covid-19 safety protocols may have affected the responses provided about the pedagogies they were using. For the 2020/21 school year**,** many of the participants had been teaching virtually, in a hybrid setting, or in A/B day setting. Social distancing and Covid-19 safety protocols were implemented according to school district policies, and these may have affected participants responses.

Effects on Strategies Used by Subject Area. The study shows that differences exist in the use of instruction strategies by subject area. The data showed that health sciences teachers were significantly more affected by Covid-19 than agriculture teachers and business, marketing, and information technology teachers. The researcher thinks this difference may be caused because health sciences courses require in-seat hours for effective completion of their programs. The researcher also thinks that business, marketing, and information technology classrooms and agriculture classrooms present fewer challenges to social distancing and Covid-19 safety protocols due to outdoor activities and larger classrooms. Engineering and technology teachers and family consumer sciences and human services teachers use of classroom instructional strategies were significantly more affected by Covid-19 than business, marketing, and information technology teachers. The researcher thinks the fact that business marketing, and information technology courses often involve the usage of computers and technology that was already embedded into the coursework could be the reason why business, marketing, and information technology teachers' use of classroom instructional strategies were significantly less affected by Covid 19 than the engineering and technology teachers and family consumer sciences and human services teachers. The researcher also thinks that engineering and

technology teachers' and family consumer sciences and human services teachers' classroom instructional strategies would incorporate more work that requires on-site completion than would business, marketing, and information technology teachers.

The researcher thinks that the significant differences of classroom instructional strategies between teachers of different demographics is an important finding because it will allow further research into reasons why the differences exist. The investigation of different strategies could develop a more effective system of providing professional development for teachers through differentiated instruction by subject area or other teacher demographics. For example, teachers with over 19 years of experience may identify as needing more professional development on technology-based instructional strategies, while teachers with less than 3 years may determine they that need professional development on classroom management techniques. Shulman (2005b) indicated that teachers can learn from teachers from other subject areas. This study has identified significant differences of instructional strategy usage that may benefit all subject areas. The researcher thinks that these significant differences may be due to legal restriction and availability. The significant difference of on-the-job training between business, marketing, and information technology and health sciences teachers may exist because of HIPAA protections of patients' personal health information (Center for Disease Control, 2021) not allowing health science students access to the workplace. Agriculture teacher may use on-the job training in rural areas more than agriculture teachers in urban areas. The researcher thinks that significant differences of usage between subject areas and regions of the United States could be due to resource availability in different areas. Perhaps providing broadband Internet access or electronic instructional devices to rural or underserved school districts might allow those teachers to use the instructional strategies that require Internet or computers.

The researcher thinks that teacher preparation programs can improve through the evaluation of their graduates' teaching practices. Teacher preparation programs can further this research by evaluating their own graduates and comparing them with graduates of other universities. Cohen and Wyckoff (2016) posed the question of how institutions can create data systems that compare graduates of different teacher preparation programs.

The researcher thinks this research could be beginning of that database that allows different teacher preparation programs to compare their graduates. These differences and their investigation could improve teacher education programs, which will in turn increase student outcomes. With this knowledge, further examination as to why the differences exist can be conducted.

Practical Significance

Increase Student Achievement

The practical significance of the results of this study could increase student achievement at the secondary and post-secondary levels of education by increasing the teachers' knowledge about classroom instructional strategies. Many factors contribute to a student's academic performance, including the student's individual characteristics and family and neighborhood experiences. Opper (2019) suggested that, among school-related factors, teachers matter most. Teachers are estimated to have two to three times the effect of any other school factor, including services, facilities, and even leadership. Shulman (2005b) also proposed that through the evaluation and observation of teaching, a signature pedagogy may emerge that becomes embedded in that subject area. Studying the instructional strategy usage of other disciplines may increase the learning of all students (Shulman, 2005b). Shulman stated that developing a signature pedagogy for a career field can develop the characteristics of future teaching and

"hopes of the professions" (2005b, p. 53). The researcher thinks it is possible that teachers who use a classroom instructional strategy requiring technology could demonstrate that strategy for teachers who do not have access or resources. Teachers who are exposed to different strategies may request access to materials or technology required for them to implement that strategy. The researcher thinks this may lead to a more widespread acceptance of technology and could lead to the purchase of curriculum that require electronic devices and Internet access.

Improve Teacher Preparation Programs

The researcher thinks that the practical significance of the results of this study could improve teacher preparation programs. Parker et al. (2016) stated that the "utility of a signature pedagogy" is in the potential to improve teacher education programs (p. 12). A central role in student learning is the quality of instruction (Feuer et al., 2013). TNTP (2012) studied results from 20,000 teachers and concluded that the top 20% of teachers could generate 5 to 6 months more student learning than the poor-performing teachers. When a high-performing teacher leaves a district, it can take up to 11 years to replace them with a similar quality teacher (TNTP, 2012) and only one of 11 potential replacements will be of similar quality. Feurer et al. (2013) stated that teacher preparation programs should be further studied with the following priorities: (1) the effects of differences in teacher preparation on graduates' effectiveness in the classroom; (2) the impact of different teacher preparation programs' evaluation systems on teacher preparation; (3) ways to integrate comprehensive measures of teacher effectiveness, including non-cognitive student output measures, into evaluation systems; and (4) ways to improve transparency, communication, and trust in evaluation systems. As the number of teachers entering their career with methods of certification other than the traditional route, the call for evaluation of teacher quality has increased (National Council on Teacher Quality, 2017).

A basic linkage exists between teacher preparation programs, quality teaching, and student learning (Feuer et al., 2013). Feuer et al. (2013) stated that "exactly how differences in instructional method and style affect student learning and how differences in teacher preparation affect instructional quality are not fully understood" (p. 80). Through further study and accountability of teacher education programs, education students may become higher-quality teachers after completing of their training. The National Council on Teacher Quality (2017) reported that 33 states do not connect student achievement to teacher preparation programs. Cohen & Wyckoff (2016) stated that only one out of four teacher preparation programs track information about how their graduates perform during licensing and even fewer track information after their graduates enter the field. The Council for the Accreditation of Education Preparation (CAEP) (2021) stated that teacher education programs continually self-assess their program and conduct research on their program's efficacy, but also recommends that programs should collect data on graduates of their programs for the purpose of improving the program. The researcher thinks that by studying existing teaching practices and examining teacher demographics and existing teaching preparation programs, the research can provide insights into the best practices for teaching teachers and the efficacy of teacher education programs. The researcher thinks that through identifying the signature pedagogies for CTE, teachers' knowledge of instructional strategies will increase, and student outcomes will improve.

P-20 Implications

Signature Pedagogy

Shulman (2005b) indicated that developing a signature pedagogy will increase student learning. This study may increase student learning by finding that questioning, guided practice, and demonstrations at the signature pedagogies of CTE. Future CTE student success may depend

on CTE and teacher preparation programs investigating and developing the most effective classroom instructional strategies for each subject area. CAEP (2021) stated that student outcome-based evidence is the center of evaluating educators' effectiveness. Once the most effective classroom strategies are determined, teacher preparation programs can review their process for teaching pedagogy. New CTE teachers who are proficient in the most effective classroom instructional strategies will increase student achievement and success.

Many future educators may be unprepared to teach in the classroom. Students preparing to teach at the K-12 level were forced to end face-to-face instruction in March of 2019. Many candidates did not get to complete the student teaching component of their education, and some were forced to delay the experience for a semester. Many teacher candidates were sent home to a state different than the one where they were teaching, and struggled to stay connected with their teacher mentors due to a lack of access to high-speed Internet access (Maher & Zollman, 2020). The researcher thinks that the research should continually be assessed on new teacher performance based on student outcomes due to the Covid-19 effects on teacher preparation programs.

Preparation for Future Pandemics

Covid-19 is not the first pandemic to spread across the United States. The yellow fever in the 1800s, the Spanish flu of 1918, and periodic influenza outbreaks have disrupted the educational systems at all levels (Thomas & Foster, 2020). Thomas and Foster (2020) indicated that Covid-19 forced 6.6 million higher education students into some type of distance education, which is up from 3.1 million involved in distance education in 2017. In 2019, the majority of higher education faculty had less than five years of experience in distance education. Vang et al. (2020) stated that success in distance learning requires proficiencies in time management,

technical competencies, creating online assignments, and basic computer operations, but not all teachers and students have those skills.

Covid-19 caused gaps in learning at all levels. Sims & Baker (2020) stated that these gaps were caused by a lack of technology and a lack of access to high-speed Internet access in rural areas. Garcia and Wiess (2020) stated that online learning and online teaching requires consistent Internet access and access to computers to be effective. Houshmandi et al. (2019) found that higher education faculty had high levels of knowledge of their content area and pedagogies but were unprepared in technology skills and knowledge of distance learning pedagogies. One issue that faculty stated were concerns about student success based on a lack of technology infrastructure and technical support for students (Fredericksen et al., 2000). The researcher thinks that professional development geared towards effective distance learning pedagogies would increase student learning. The researcher thinks that further examination of the effects of Covid-19 on instructional strategies used will better prepare school districts and future educators for the next pandemic.

Limitations of the Study

One limitation of this study of CTE teachers is the small sample size from different regions of the United States. Large numbers of teachers from Georgia and Missouri participated, while there were no participants indicated they were from North Dakota and Hawaii. Three participants identified they were not sure what state they were teaching in, which may indicate that they were changing jobs. The number of teachers indicating they did not know what state they taught in and the low number of teacher reporting from some regions could skew the statistical analysis of the data.

A second limitation of the study is that only 620 of the participants answered question number 13, regarding how often they use lecture. The reduced number of responses to this question could have a significant impact on the results of the data analysis. A third limitation of the study could be in question 7 concerning how the participants earned their teaching certificate. The survey did not explain the differences between the four routes to certification participants were given to choose from. This means that a participant may have indicated a route different from the one the participant actually used to earn certification. A fourth limitation of the study was that the results of question 18 were not added to the statistical analysis due to the vague answers and possible misinterpretation of the data by the researcher. A fifth limitation of the study could be a lack of understanding of nomenclature for different classroom instructional strategies. For example, one teacher may define a certain learning strategy as project-based learning, while another may define the same strategy as on-the-job learning.

A sixth limitation of this study is that it was conducted during the Covid-19 pandemic. The study was sent out during uncertain times while some schools were conducting in-person learning, some were conducting virtual learning, and some were conducting hybrid learning. Under those circumstances, there is uncertainty about whether the participants' answers reflected their usage in the pandemic classroom setting or the pre-pandemic classroom settings. Because of that, data indicated about pedagogy usage in their current classroom setting may not be applicable for future studies. The researcher acknowledges that, due to the nature of the research and the sample sizes, any patterns identified maybe a result of coincidence.

Recommendations for Future Study

Based on the research design, data collected and analyzed and the researcher's experiences, the researcher presents the following recommendations:

1. Future researchers may investigate which strategy has the largest impact on student learning.
2. Future research should examine student outcomes based on the teachers' method of certification.
3. Future research should investigate student outcomes based on the accreditation of the higher education institutions where teachers completed the coursework required for their method of certification.
4. More research is required to determine the signature pedagogy of education.
5. More research is required to determine the effects of Covid-19 or any future pandemic on student achievement.
6. Future research should investigate the effect of professional development on the use of different pedagogies at each of the types of educational settings.
7. Future research may consider expanding the study to a larger population of CTE teachers located in each region, which would address any concerns of external validity and generalization of the sample to the population.
8. Future researchers may examine what is going on inside the CTE classrooms though case study analysis to provide greater insight in the actual classroom teachers' practices.

Conclusion

This research investigated the signature pedagogies of CTE teachers in the United States and determined whether a teacher's demographics affected the usage of classroom instructional strategies and if Covid-19 had any effect on the classroom instructional strategies. Chapter V presented an overview, discussed the conclusions, the findings for the Research Question 1, Research Question 2, and Research Question 3. The discussion also included practical significance, P-20 implications, limitations of the study, and recommendations for future study.

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APPENDIX A

Fletcher, Djajalaksana, and Eison's Original Data Collection Instrument

CTE Instructional Strategies Survey 2012

Welcome to the Career and Technical Education (CTE) Instructional Strategies survey questionnaire!
We appreciate your consent to participate in this study.
You will only need approximately 10 minutes to complete all the questions in this survey.
Please proceed to the next page to begin the first question.

Thank you!

***Are you teaching in a higher education setting?**

Please check one answer below

◯ Yes

◯ No

Section 1. Participant, Course, and Institution Profile

1. Position

Please check one answer below

- ◯ Graduate Assistant
- ◯ Adjunct Faculty
- ◯ Instructor / Lecturer
- ◯ Assistant Professor
- ◯ Associate Professor
- ◯ Full Professor
- ◯ Other (please specify)

2. In which discipline do you teach?

Please check one or more answers below

- ☐ Agricultural Education
- ☐ Business and/or Marketing Education
- ☐ Family and Consumer Sciences Education
- ☐ Engineering / Technology Education
- ☐ Trade and Industrial Education
- ☐ Health Occupation Education
- ☐ Other (please specify)

Section 1 (Continued). Participant, Course, and Institution Profile

3. Course Name

Please identify one specific COURSE that you teach regularly and type the course name in the space provided.

Use this course as your reference point when completing the survey.

4. Level of course identified in Question 3

Please check one or more answers below

- ☐ Undergraduate-level course
- ☐ Master-level course
- ☐ Doctoral-level course

5. Total years of experience teaching the course identified in Question 3

Please express numerically (e.g., 3)

6. Did you complete a four-year teacher preparation program?

Please check one answer below

- ◯ Yes
- ◯ No
- ◯ No, but I completed an alternative licensure program

Section 1 (Continued). Participant, Course, and Institution Profile

7. Delivery format of the course identified in Question 3

Please check one or more answers below

- ☐ **Blended** (Courses which integrate both face-to-face and online components and deliver anywhere from 30 to 60% of instruction online)
- ☐ **Face-to-face only** (Courses which deliver at least 80% of its content in person)
- ☐ **Online only** (Courses which deliver at least 80% of the content on the Internet)

8. Approximate class size of the course identified in Question 3

Please check one answer below

- ◯ 1-14 students
- ◯ 15-29 students
- ◯ 30-49 students
- ◯ 50 or more students

Section 1 (Continued). Participant, Course, and Institution Profile

9. The institution type where you teach the course identified in Question 3

Please check one answer below

- ◯ Two-year College
- ◯ Four-year College/ Baccalaureate-degree-granting College
- ◯ University/ Graduate-degree-granting Institution
- ◯ Other (please specify)

10. Name of your institution

Please type your answer below

11. Location of your institution

Please check one answer below

- ◯ United States including Puerto Rico
- ◯ Outside of United States or Puerto Rico

Section 1 (Continued). Participant, Course, and Institution Profile

12. Gender

Please check one answer below

◯ Male ◯ Female

13. Age

Please express numerically (e.g., 32)

14. Ethnicity

Choose one or more answers below

☐ White or Caucasian

☐ Black or African American

☐ American Indian or Alaska Native

☐ Asian

☐ Native Hawaiian or Other Pacific Islander

☐ Hispanic

Other (please specify)

Section 2 . Frequency of Instructional Strategies Use

15. For the course you identified in Question 3, please read the list of ACTIVITIES below and use the scale provided to describe your frequency of use (i.e., Never, Rarely, Occasionally, Frequently, or Almost Always/ Always).

To view a brief description of each ACTIVITY, simply place your mouse pointer over the term description...

	Never	Rarely	Occasionally	Frequently	Almost Always	Always
LECTURE description...	◯	◯	◯	◯	◯	◯
INTERACTIVE LECTURE description...	◯	◯	◯	◯	◯	◯
QUESTIONING description...	◯	◯	◯	◯	◯	◯
QUESTION & ANSWER USING CLICKERS/ PERSONAL RESPONSES SYSTEMS description...	◯	◯	◯	◯	◯	◯
GUEST LECTURE description...	◯	◯	◯	◯	◯	◯
THINK/ PAIR/ SHARE description...	◯	◯	◯	◯	◯	◯
GUIDED PRACTICE description...	◯	◯	◯	◯	◯	◯
WHOLE GROUP DISCUSSION description...	◯	◯	◯	◯	◯	◯
SMALL-GROUP STUDENT DISCUSSIONS description...	◯	◯	◯	◯	◯	◯
MINUTE PAPER/ SENTENCE SUMMARY description...	◯	◯	◯	◯	◯	◯
BRAINSTORMING description...	◯	◯	◯	◯	◯	◯
STUDENT PEER TEACHING description...	◯	◯	◯	◯	◯	◯

More ACTIVITIES in the next page...

Section 2 (Continued). Frequency of Instructional Strategies Use

15 (Continued). For the course you identified in Question 3, please read the list of ACTIVITIES below and use the scale provided to describe your frequency of use (i.e., Never, Rarely, Occasionally, Frequently, or Almost Always/ Always).

To view a brief description of each ACTIVITY, simply place your mouse pointer over the term description...

	Never	Rarely	Occasionally	Frequently	Almost Always	Always
COOPERATIVE LEARNING/ TEAM-BASED LEARNING description...	◯	◯	◯	◯	◯	◯
LECTURE NOTE COMPARISON/ SHARING description...	◯	◯	◯	◯	◯	◯
STUDENT PRESENTATIONS description...	◯	◯	◯	◯	◯	◯
DEMONSTRATIONS description...	◯	◯	◯	◯	◯	◯
PROBLEM BASED LEARNING description...	◯	◯	◯	◯	◯	◯
ROLE PLAY description...	◯	◯	◯	◯	◯	◯
GAMES description...	◯	◯	◯	◯	◯	◯
DEBATES description...	◯	◯	◯	◯	◯	◯
INFORMAL WRITING description...	◯	◯	◯	◯	◯	◯
QUIZZES description...	◯	◯	◯	◯	◯	◯
REVIEW SESSIONS description...	◯	◯	◯	◯	◯	◯
LAB ACTIVITIES description...	◯	◯	◯	◯	◯	◯

Section 2 (Continued). Frequency of Instructional Strategies Use

16. For the course you identified in Question 3, please read the list of possible ONLINE ACTIVITIES below and use the scale provided to describe your frequency of use (i.e., Never, Rarely, Occasionally, Frequently, or Almost Always/ Always).

To view a brief description of each ONLINE ACTIVITY, simply place your mouse pointer over the term description...

	Never	Rarely	Occasionally	Frequently	Almost Always	Always
ONLINE DISCUSSIONS description...	◯	◯	◯	◯	◯	◯
REFLECTIVE BLOGS description...	◯	◯	◯	◯	◯	◯
ONLINE FORMATIVE QUIZZES description...	◯	◯	◯	◯	◯	◯
ONLINE COLLABORATIVE PROJECTS description...	◯	◯	◯	◯	◯	◯
SYNCHRONOUS ONLINE LECTURE description...	◯	◯	◯	◯	◯	◯
ASYNCHRONOUS ONLINE LECTURE description...	◯	◯	◯	◯	◯	◯
PARTICIPATION IN SOCIAL NETWORKING description...	◯	◯	◯	◯	◯	◯
ONLINE/E-PORTFOLIO description...	◯	◯	◯	◯	◯	◯
SELF-DIRECTED LEARNING description...	◯	◯	◯	◯	◯	◯
BACKGROUND KNOWLEDGE PROBE/ JUST-IN-TIME TEACHING description...	◯	◯	◯	◯	◯	◯
COMPUTER-BASED LEARNING EXERCISES/ GAMES/ SIMULATIONS description...	◯	◯	◯	◯	◯	◯

Section 2 (Continued). Frequency of Instructional Strategies Use

17. For the course you identified in Question 3, please read the list of possible ASSIGNMENTS below and use the scale provided to describe your frequency of use (i.e., Never, Rarely, Occasionally, Frequently, or Almost Always/ Always).

To view a brief description of each ASSIGNMENT type, simply place your mouse pointer over the term description...

	Never	Rarely	Occasionally	Frequently	Almost Always	Always
CASE STUDY description...	◯	◯	◯	◯	◯	◯
LITERATURE REVIEW description...	◯	◯	◯	◯	◯	◯
ORIGINAL RESEARCH PROPOSAL description...	◯	◯	◯	◯	◯	◯
SHORT PAPER description...	◯	◯	◯	◯	◯	◯
MAJOR WRITING PROJECT/ TERM PAPER description...	◯	◯	◯	◯	◯	◯
STUDENT-GENERATED QUIZ/ EXAMS description...	◯	◯	◯	◯	◯	◯
CONCEPT MAPS/ MIND MAPS description...	◯	◯	◯	◯	◯	◯
STUDENT ATTITUDE SURVEY description...	◯	◯	◯	◯	◯	◯
CAMPUS EVENTS description...	◯	◯	◯	◯	◯	◯

More ASSIGNMENTS in the next page...

Section 2 (Continued). Frequency of Instructional Strategies Use

17 (Continued). For the course you identified in Question 3, please read the list of possible ASSIGNMENTS below and use the scale provided to describe your frequency of use (i.e., Never, Rarely, Occasionally, Frequently, or Almost Always/ Always).

To view a brief description of each ASSIGNMENT type, simply place your mouse pointer over the term description...

	Never	Rarely	Occasionally	Frequently	Almost Always	Always
FILM/ VIDEO CRITIQUE description...	◯	◯	◯	◯	◯	◯
ANNOTATED BIBLIOGRAPHY/ WEBLIOGRAPHY description...	◯	◯	◯	◯	◯	◯
SELF ASSESSMENT description...	◯	◯	◯	◯	◯	◯
PERSONAL REFLECTION JOURNAL description...	◯	◯	◯	◯	◯	◯
LEARNING PORTFOLIO description...	◯	◯	◯	◯	◯	◯
FIELD TRIPS description...	◯	◯	◯	◯	◯	◯
SERVICE LEARNING description...	◯	◯	◯	◯	◯	◯
VIDEO CREATION description...	◯	◯	◯	◯	◯	◯
STUDENT PEER ASSESSMENT description...	◯	◯	◯	◯	◯	◯

Section 3. Most often instructional strategies

18. In your teaching of the course you selected in Question 3, what are the THREE (3) instructional strategies you use most frequently?

Please check THREE (3) instructional strategies from this list.

To view a brief description of each instructional strategy, simply place your mouse pointer over the specific term you would like to know

- ☐ LECTURE
- ☐ INTERACTIVE LECTURE
- ☐ QUESTIONING
- ☐ QUESTION & ANSWER USING CLICKERS/ PERSONAL RESPONSES SYSTEMS
- ☐ GUEST LECTURE
- ☐ THINK/ PAIR/ SHARE
- ☐ GUIDED PRACTICE
- ☐ WHOLE GROUP DISCUSSION
- ☐ SMALL-GROUP STUDENT DISCUSSIONS
- ☐ MINUTE PAPER/ SENTENCE SUMMARY
- ☐ BRAINSTORMING
- ☐ STUDENT PEER TEACHING
- ☐ COOPERATIVE LEARNING/ TEAM-BASED LEARNING
- ☐ LECTURE NOTE COMPARISON/ SHARING
- ☐ STUDENT PRESENTATIONS
- ☐ DEMONSTRATIONS
- ☐ PROBLEM BASED LEARNING
- ☐ ROLE PLAY
- ☐ GAMES
- ☐ COMPUTER SIMULATIONS
- ☐ LAB ACTIVITIES
- ☐ DEBATES
- ☐ IN-CLASS INFORMAL WRITING
- ☐ QUIZZES
- ☐ REVIEW SESSIONS
- ☐ CASE STUDY
- ☐ LITERATURE REVIEW
- ☐ ORIGINAL RESEARCH PROPOSAL
- ☐ SHORT PAPER
- ☐ MAJOR WRITING PROJECT/ TERM PAPER
- ☐ STUDENT-GENERATED QUIZ/ EXAMS
- ☐ CONCEPT MAPS/ MIND MAPS
- ☐ STUDENT ATTITUDE SURVEY
- ☐ CAMPUS EVENTS
- ☐ FILM/ VIDEO CRITIQUE
- ☐ ANNOTATED BIBLIOGRAPHY/ WEBLIOGRAPHY
- ☐ SELF ASSESSMENT
- ☐ PERSONAL REFLECTION JOURNAL
- ☐ LEARNING PORTFOLIO
- ☐ FIELD TRIPS
- ☐ SERVICE LEARNING
- ☐ VIDEO CREATION
- ☐ STUDENT PEER ASSESSMENT
- ☐ ONLINE DISCUSSIONS
- ☐ REFLECTIVE BLOGS
- ☐ ONLINE FORMATIVE QUIZZES
- ☐ ONLINE COLLABORATIVE PROJECTS
- ☐ SYNCHRONOUS ONLINE LECTURE
- ☐ ASYNCHRONOUS ONLINE LECTURE
- ☐ PARTICIPATION IN SOCIAL NETWORKING
- ☐ ONLINE/E-PORTFOLIO
- ☐ SELF-DIRECTED LEARNING
- ☐ BACKGROUND KNOWLEDGE PROBE/ JUST-IN-TIME TEACHING
- ☐ COMPUTER-BASED LEARNING EXERCISES/ GAMES/ SIMULATIONS

CTE Instructional Strategies Survey 2012

If you cannot find the strategies you use most frequently from the list above, please specify in the text boxes below

OTHER 1

OTHER 2

OTHER 3

Section 4. Feedback

19. Please provide any comments on the instructional strategies you or other faculty members use in teaching courses in career and technical education.

Please type your answer below

20. Should we need more insights from you, would you care to follow up with a phone interview?

Please check one answer below

- ◯ No
- ◯ Yes (please type phone number to contact)

21. If you would like to receive a copy of the survey findings when completed, please note your email address below.

Please type your email address

CTE Instructional Strategies Survey 2012

Thank you very much for your participation in this survey!

APPENDIX B

Survey Instrument and Consent Form

CTE Instructional Strategies Survey 2020/21

1. CTE Instructional Strategy Survey

We are inviting you to participate in a web-based online survey on instructional strategies used by Career and Technical Education (CTE) teachers. This research project is being conducted by Jonathan Walker, a doctoral student at Murray State University in Murray Kentucky. The survey should take approximately 11 minutes of your time to complete. The next page of the survey is the informed consent page.

CTE Instructional Strategies Survey 2020/21

2. Internet-Based Survey Consent Form

Dear Potential Research Participant:

We are inviting you to participate in a web-based online survey on instructional strategies used by Career and Technical Education (CTE) teachers. This research project is being conducted by Jonathan Walker, a doctoral student at Murray State University in Murray Kentucky. The survey should take approximately 10 minutes of your time to complete.

PURPOSE: The purpose of the study is to investigate which instructional strategies are being used in CTE classrooms and if teachers' demographics affect the instructional strategies which they use.

Your participation in this survey is voluntary. You may refuse to participate in the research, and you may also exit the survey at any time without penalty. You are free to decline to answer any particular question you do not wish to answer for any reason.

RESEARCH METHOD

The data for this research will be collected through a SurveyMonkey internet-based survey of CTE teachers, which consists of 20 questions.

BENEFITS

You will benefit from participating in this research by gaining firsthand experience in research. Your responses may help us learn more about which instructional strategies are being used in CTE classrooms. You may also contact the researcher and request summary data once the research has been completed.

RISKS
There are no foreseeable risks involved in participating in this study other than those encountered in everyday life.

CONFIDENTIALITY
As you complete your electronic survey, your data will be stored at SurveyMonkey.com in a password protected system. The research instrument will not solicit identifiable information, nor does SurveyMonkey collect identifying information such as your name, email address, or IP address. Therefore, your responses will remain anonymous. No one will be able to identify you or your data, and no one will know whether or not you participated in the study.
The survey will be completely anonymous and not collect any identifiable information. Confidentiality will be maintained to the highest degree permitted by the technology used. No guarantee will be made regarding the interception of data sent via the internet by any third parties.
CONTACT
If you have questions at any time about the study or the procedures, you may contact the researcher, Jonathan Walker (660.341.9407) or jwalker@kirksville.k12.mo.us or my research advisor, Dr. Randall Wilson (rwilson@murraystate.edu).

If you feel you have not been treated according to the descriptions in this form, or that your rights as a research participant have not been honored during the course of this project, or you have any questions, concerns, or complaints that you wish to address to someone other than the investigator, you may contact Jonathan Baskin the Research Compliance officer at Murray State University at 270 890 2916 or by email at msu.irb@murraystate.edu.

ELECTRONIC CONSENT: Please select your choice below. You may print a copy of this consent form for your records. Clicking on the "Agree" button indicates that:

- **You have read the above information;**
- **You voluntarily agree to participate;**
- **You are 18 years of age or older; and**
- **You are employed as a CTE teacher for the 2020-21 school year.**

* 1. Please select one of the following indicating your choice to be in the survey

- ◯ Agree. Yes, I consent to participate in the study
- ◯ Disagree. No, I do not consent to participate in the study

CTE Instructional Strategies Survey 2020/21

3. CTE Signature Pedagogy Research

Welcome to the Career and Technical Education Instructional Strategies research questionnaire! We

appreciate your consent to participate in this study. We need approximately 10 minutes of your time to complete all the questions in this survey.

Thank You!

2. In which state are you teaching in?

- Alaska
- Alabama
- Arizona
- Arkansas
- California
- Colorado
- Conecticut
- Delaware
- Florida
- Georgia
- Hawaii
- Idaho
- Illinois
- Indiana
- Iowa
- Kansas
- Kentucky
- Louisiana
- Maine
- Maryland
- Massachusetts
- Michigan
- Minnesota
- Mississippi
- Missouri
- Montana
- Nebraska
- Nevada
- New Hampshire
- New Jersey
- New Mexico
- New York
- North Carolina
- North Dakota
- Ohio
- Oklahoma
- Oregon
- Pennsylvania
- Rhode Island
- South Carolina
- Tennessee
- Texas
- Utah
- Vermont
- Virginia
- Washington
- West Virginia
- Wisconsin
- Wyoming
- I am not sure
- I prefer not to answer

3. Which of the following geographical settings would you consider your school?

- ◯ Urban
- ◯ Rural
- ◯ Suburban
- ◯ I am not sure
- ◯ I prefer not to answer

4. In which type of school is your primary location of teaching?

- ◯ Area career center
- ◯ Comprehensive high school
- ◯ Community College
- ◯ 4-year University
- ◯ I am not sure

CTE Instructional Strategies Survey 2020/21

4. Section 2

* 5. Select one of the following areas which you consider your primary CTE subject area

- ◯ Agriculture Education
- ◯ Business, Marketing, & Information Technology
- ◯ Family Consumer Sciences & Human Services
- ◯ Skilled Technical Sciences
- ◯ Health Sciences
- ◯ Engineering and Technology Education (e.g., Industrial Technology, Technology Education, PTLW, Industrial Arts, Understanding byDesign)
- ◯ Not a CTE teacher

* 6. Please identify one specific Course that you teach regularly and type the course name in the space provided.
Use this course as your reference point when completing the survey.

CTE Instructional Strategies Survey 2020/21

5. Certificate Questions

* 7. How did you earn your teaching certificate?

- Traditional method through a 4-year University with a student teaching component
- Alternative or Innovative Certification method (e.g., post-baccalaureate with teaching internship: ABCTE; other state-approved alternative certification option)
- Career Education Certification method: Traditional CTE coursework (e.g., based on industry, clinical or military experiences; completing stand-alone college courses)
- Career Education Certification method: CTTE cohort courses (e.g., based on industry, clinical or military experiences, completing required CTTE cohort courses)

8. How many years have you been teaching?

- 0-3 years
- 4-7 years
- 8-11 years
- 12-15 years
- 16-19 years
- 20-23 years
- more than 23 years
- I prefer not to answer

CTE Instructional Strategies Survey 2020/21

6. Person of Significance

* 9. Did you have a person of significance in your life who was a teacher before you became certified to teach (e.g., a parent/guardian, grandparent, aunt, uncle, sibling, another teacher, etc.)?

- Yes
- No
- I prefer not to answer

CTE Instructional Strategies Survey 2020/21

7. Instructional Strategies

This section consists of a list of classroom strategies. Mark whether you Never, Rarely, Occasionally, Frequently, Almost Always, or Always use the strategy in your classroom.

10. Instructional Strategy Usage in the Classroom

	Never	Rarely	Occasionally	Frequently	Almost Always	Always
Questioning						
Whole Group Discussion						
Guided Practice						
Interactive Lecture						
Self-Directed Learning						
Major Writing Project						
Lab Activities						
Demonstrations						
Student Presentations						

CTE Instructional Strategies Survey 2020/21

8. Classroom Instructional Strategies (continued)

11. Instructional Strategy Usage in the Classroom (continued)

	Never	Rarely	Occasionally	Frequently	Almost Always	Always
Short Paper						
Student Peer Assessment						
Small-Group Discussion						
Online Discussions						
Quizzes						
Personal Reflection						
Cooperative Learning						
Learning Portfolio						
Student Attitude Survey						

CTE Instructional Strategies Survey 2020/21

9. Classroom Instructional Strategies (continued)

12. Instructional Strategy Usage in the Classroom (continued)

	Never	Rarely	Occasionally	Frequently	Almost Always	Always
Brainstorming	○	○	○	○	○	○
Asynchronous Online	○	○	○	○	○	○
Student Peer Teaching	○	○	○	○	○	○
Review Sessions	○	○	○	○	○	○
Literature Review	○	○	○	○	○	○
Online/E-Portfolio	○	○	○	○	○	○
Case Study	○	○	○	○	○	○

13. Instructional Strategy Usage in the Classroom (continued)

	Never	Rarely	Occasionally	Frequently	Almost Always	Always
Lecture	○	○	○	○	○	○
Question & Answer using clickers/Personal Response Systems	○	○	○	○	○	○
Guest Lecture	○	○	○	○	○	○
Think/Pair/Share	○	○	○	○	○	○
Minute Paper/Sentence Summary	○	○	○	○	○	○
Problem Based Learning	○	○	○	○	○	○
Role Play	○	○	○	○	○	○

Other (please specify)

14. Instructional Strategy Usage in the Classroom (continued)

	Never	Rarely	Occasionally	Frequently	Almost/Always	Always
Games						
Computer Simulations						
Debates						
In-Class Informal Writing						
Original Research Proposal						
Student-Generated Quiz/Exams						
Concept Maps/Mind Maps						
Campus Events						
Film/Video Critique						

15. Instructional Strategy Usage in the Classroom (continued)

	Never	Rarely	Occasionally	Frequently	Almost Always	Always
Annotated Bibliography/Webliography						
Self Assessment						
Field Trips						
Service Learning						
Video Creation						
Online Discussion						
Reflective Blogs						
Online Formative Quizzes						

16. Instructional Strategy Usage in the Classroom (continued)

	Never	Rarely	Occasionally	Frequently	Almost Always	Always
Online Collaborative Projects	○	○	○	○	○	○
Synchronous Online Lecture	○	○	○	○	○	○
Participation in Social Networking	○	○	○	○	○	○
Computer-Based Learning Exercises/Games Simulations	○	○	○	○	○	○
Project-based Learning	○	○	○	○	○	○
On-the-Job Training	○	○	○	○	○	○
Work-based Learning (SAE or SBE)	○	○	○	○	○	○
Other*	○	○	○	○	○	○

* If other, please list:

CTE Instructional Strategies Survey 2020/21

10. Three Instructional Strategies used the most

* 17. In the teaching of the course you selected in Question 3, what are the THREE (3) instructional strategies you use the most?
Please check only check three (3) instructional strategies from this list

- [ ] Lecture
- [ ] Interactive Lecture
- [ ] Questioning
- [ ] Question & Answer using clickers/Personal Response Systems
- [ ] Guest Lecture
- [ ] Think/Pair/Share
- [ ] Guided Practice
- [ ] Whole Group Discussion
- [ ] Small-Group Student Discussions
- [ ] Minute Paper/Sentence Summary
- [ ] Brainstorming
- [ ] Student peer Teaching
- [ ] Cooperative Learning/Team-Based Learning
- [ ] Student Presentations
- [ ] Demonstrations
- [ ] Problem Based Learning
- [ ] Role Play
- [ ] Games
- [ ] Computer Simulations
- [ ] Lab Activities
- [ ] Debates
- [ ] In-Class Informal Writing
- [ ] Quizzes
- [ ] Review Sessions
- [ ] Case Study
- [ ] Literature Review
- [ ] Original Research Proposal
- [ ] Short Paper
- [ ] Major Writing Project/Term Paper
- [ ] Student-Generated Quiz/Exams
- [ ] Concept Maps/ Mind Maps
- [ ] Student Attitude Survey
- [ ] Campus Events
- [ ] Film/Video Critique
- [ ] Annotated Bibliography/Webliography
- [ ] Self Assessment
- [ ] Personal Reflection Journal
- [ ] Learning Portfolio
- [ ] Field Trips
- [ ] Service Learning
- [ ] Video Creation
- [ ] Student Peer Assessment
- [ ] Online Discussions
- [ ] Reflective Blogs
- [ ] Online Formative Quizzes
- [ ] Online Collaborative Projects
- [ ] Synchronous Online Lecture
- [ ] Asynchronous Online Lecture
- [ ] Participation in Social Networking
- [ ] Online/E-Portfolio
- [ ] Self-Directed Learning
  Background knowledge Probe/Just-In-Time Teaching
- [ ] Computer-Based Learning Exercises/Games Simulations
- [ ] Project-Based Learning
- [ ] On-the-Job Training
- [ ] Work-based learning (SAE/SBE)

18. If you cannot find the strategies you use most frequently above, please specify in the text boxes below.

Other 1

Other 2

Other 3

CTE Instructional Strategies Survey 2020/21

11. Effects of Covid-19

19. What effect did Covid-19 affect the classroom instructional strategies that you used in the course you identified above?

no affect	rarely affected	occasionally affected	almost always affected	always affected
○	○	○	○	○

* 20. If you selected something other than Never for Question 19, please explain how Covid-19 has affected your choice of classroom instructional strategies.

If you have any questions about the survey, or have other information to contribute, or would like to request a summary of the research results, please email me at jwalker@kirksville.k12.mo.us

CTE Instructional Strategies Survey 2020/21

12. Additional Information

* 21. What other information would you like to provide regarding the instructional strategies you use in your CTE courses.

Appendix C

IRB Approval

MURRAY STATE UNIVERSITY

Institutional Review Board

328 Wells Hall
Murray, KY 42071-3318
270-809-2916• msu.irb@murraystate.edu

TO: Randal Wilson, College of Education and Human Services

FROM: Jonathan Baskin, IRB Coordinator JB

DATE: 1/22/2021

RE: Human Subjects Protocol I.D. – IRB # 21-091

The IRB has completed its review of your student's Level 1 protocol entitled *An Investigation into CTE Teacher Classroom Strategies*. After review and consideration, the IRB has determined that the research, as described in the protocol form, will be conducted in compliance with Murray State University guidelines for the protection of human participants.

The forms and materials that have been approved for use in this research study are attached to the email containing this letter. These are the forms and materials that must be presented to the subjects. Use of any process or forms other than those approved by the IRB will be considered misconduct in research as stated in the MSU IRB Procedures and Guidelines section 20.3.

Your stated data collection period is from 3/1/2021 to 4/30/2021.

If data collection extends beyond this period, please submit an Amendment to an Approved Protocol form detailing the new data collection period and the reason for the change.

This Level 1 approval is valid until 1/21/2022.

If data collection and analysis extends beyond this date, the research project must be reviewed as a continuation project by the IRB prior to the end of the approval period, 1/21/2022. You must reapply for IRB approval by submitting a Project Update and Closure form (available at murraystate.edu/irb). You must allow ample time for IRB processing and decision prior to your expiration date, or your research must stop until such time that IRB approval is received. If the research project is completed by the end of the approval period, then a Project Update and Closure form must be submitted for IRB review so that your protocol may be closed. It is your responsibility to submit the appropriate paperwork in a timely manner.

The protocol is approved. You may begin data collection now.

Appendix D

Researcher Emails to National CTE Associations and State CTE Directors

1st Email to CTE State Director and State Career Center Administration Association Directors

Dear State CTE Director, CTSO National Director and State Career Center Administration Association Directors:

I am requesting you forward the following email to your secondary and postsecondary CTE administrators to forward out to their certified teaching staff.

Directors
I am an Ed.D.student at Murray State University, working under the mentorship of Dr. Randal Wilson. For my dissertation, I am going to conduct research on what teaching strategies are being used in Career and Technical Education (CTE) classrooms in Missouri and how certain teacher demographics may affect which strategies are used. This is important research because it could reveal information which could lead to identifying the signature pedagogy of CTE and could change how teachers are taught at the higher education level, how teachers become certified, how the mentoring processes work and how teachers are selected in the hiring process. The effects of Covid-19 on CTE classrooms has yet to be determined. The survey does not collect an identifiable information and is completely anonymous. It will take approximately 10 minutes to complete.
I request that you forward this email to all of your certified teaching staff for them to complete.

Teachers please click the hyperlink to being the survey.
Instructional Strategies Survey
Jonathan Walker
EdD student at Murray State University

1st Email to CTSO National Directors

National Directors:
I am an Ed.D.student at Murray State University, working under the mentorship of Dr. Randal Wilson. For my dissertation, I am going to conduct research on what teaching strategies are being used in Career and Technical Education (CTE) classrooms in Missouri and how certain teacher demographics may affect which strategies are used and what effect Covid-19 has had on CTE classrooms. This is important research because it could reveal information which could lead to identifying the signature pedagogy of CTE and could change how teachers are taught at the higher education level, how teachers become certified, how the mentoring processes work and how teachers are selected in the hiring process. The effects of Covid-19 in CTE classrooms has yet to be determined. The survey does not collect an identifiable information and is completely anonymous. It will take approximately 10 minutes to complete.
I request that you forward this email to all of your certified teaching staff for them to complete.

Teachers please click the hyperlink to being the survey.
Instructional Strategies Survey
Jonathan Walker
EdD student at Murray State University

2nd Email to CTE State Director and State Career Center Administration Association Directors

2nd Request for Survey participation

State CTE Directors and Career Center Administration Association Directors:

I would request that you forward this email out to your secondary and postsecondary CTE Administrators again seven days after the initial email.

Directors:

I would like to remind you that I am an Ed.D.student at the Murray State University, working under the mentorship of Dr. Randal Wilson. For my dissertation, I am going to conduct research on what teaching strategies are being used in Career and Technical Education (CTE) classrooms in Missouri and how certain teacher demographics may affect which strategies are used and is important research because it could reveal information which could lead to identifying the signature pedagogy of CTE. The results of this study could change how teachers are taught at the higher education level, how teachers become certified, how the mentoring processes work and how teachers are selected in the hiring process. The effects of Covid-19 on CTE classrooms has yet to be determined. The survey does not collect an identifiable information and is completely anonymous. The survey will take approximately 10 minutes to complete.

I request that you again forward this email to all of your certified teaching staff for them to complete.

Teachers please click the link to begin the survey

Instructional Strategies Survey

Jonathan Walker

EdD student at Murray State University

2nd Email to CTSO National Directors
2nd Request for Survey participation
CTSO National Directors.
I would request that you forward this email out to your secondary and postsecondary CTE Administrators again seven days after the initial email.

National Directors

I would like to remind you that I am an Ed.D.student at the Murray State University, working under the mentorship of Dr. Randal Wilson. For my dissertation, I am going to conduct research on what teaching strategies are being used in Career and Technical Education (CTE) classrooms in Missouri and how certain teacher demographics may affect which strategies are used and is important research because it could reveal information which could lead to identifying the signature pedagogy of CTE. The results of this study could change how teachers are taught at the higher education level, how teachers become certified, how the mentoring processes work and how teachers are selected in the hiring process. The effects of Covid-19 on CTE classrooms has yet to be determined. The survey does not collect an identifiable information and is completely anonymous. The survey will take approximately 10 minutes to complete.
I request that you again forward this email to all of your certified teaching staff for them to complete.

Teachers please click the link to begin the survey
Instructional Strategies Survey
Jonathan Walker
EdD student at Murray State University

3rd Email to CTE State Director and State Career Center Administration Association Directors

Directors:

It is 14 days after the initial email with my survey embedded and I would like to request you forward this email to your secondary and postsecondary administrators. This will be my last request to forward an email.

Administrators and Directors

I would like to remind you that I am an Ed.D.student at the Murray State University, working under the mentorship of Dr. Randal Wilson. For my dissertation, I am going to conduct research on what teaching strategies are being used in Career and Technical Education (CTE) classrooms in Missouri and how certain teacher demographics may affect which strategies are used. This is important research because it could reveal information which could lead to identifying the signature pedagogy of CTE and the results of this study could change how teachers are taught at the higher education level, how teachers become certified, how the mentoring processes work and how teachers are selected in the hiring process. The effects of Covid-19 on CTE classrooms have not been determined. The survey does not collect an identifiable information and is completely anonymous. I request that you again forward this email to all of your certified teaching staff for them to complete.

Teachers please click the hyperlink to begin the survey.

Instruction Strategies Survey

Jonathan Walker

EdD Student at Murray State University

Appendix E

Most-Used Classroom Instructional Strategies by Mean

Classroom Instructional Strategy	N		Mean	Std. Deviation
	Valid	Missing		
Questioning	995	111	3.8915	0.98698
Whole Group Discussion	1074	32	3.4348	1.10828
Guided Practice	1075	31	3.6865	0.9969
Interactive Lecture	1072	34	3.2463	1.16315
Self-Directed Learning	1077	29	3.2386	1.07682
Major Writing Project	1081	25	1.5125	1.12632
Lab Activities	1074	32	3.5652	1.41353
Demonstrations	1086	20	3.581	1.19228
Student Presentations	1093	13	2.7457	1.27144
Short Paper	1051	55	1.6346	1.08131
Student Peer Assessment	1076	30	1.9647	1.16246
Small-Group Discussion	1082	24	2.7218	1.13528
Online Discussions	1072	34	1.7845	1.32604
Quizzes	1073	33	2.8677	1.27666
Personal Reflection	1068	38	2.6564	1.28829
Cooperative Learning	1070	36	3.1486	1.20467
Learning Portfolio	1072	34	2.0047	1.55718
Student Attitude Survey	1072	34	1.5896	1.3422
Brainstorming	1007	99	2.8987	1.18123
Asynchronous Online	1009	97	2.2289	1.48341
Student Peer Teaching	1018	88	2.1857	1.17241
Review Sessions	1020	86	2.802	1.20353
Literature Review	1011	95	1.3887	1.19082
Online/E-Portfolio	1013	93	1.463	1.47035
Case Study	1021	85	1.954	1.33462
Lecture	620	486	2.8645	1.20889
Question & Answer Using clickers/Personal Response Systems	956	150	1.4603	1.42141
Guest Lecture	964	142	1.7635	1.00573
Think/Pair/Share	961	145	2.078	1.28012
Minute Paper/Sentence Summary	977	129	1.2344	1.26155
Problem Based Learning	1004	102	3.249	1.26292
Role Play	994	112	1.7827	1.38582
Games	892	214	2.1525	1.20384
Computer Simulations	1011	95	2.1405	1.35853
Debates	990	116	1.3586	1.10413
	N			

Classroom Instructional Strategy (continued)	Valid	Missing	Mean	Std. Deviation
In-Class Informal Writing	1008	98	1.6458	1.18772
Original Research Proposal	1011	95	1.0277	1.0978
Student-Generated Quiz/Exams	1012	94	1.0474	1.18084
Concept Maps/Mind Maps	1004	102	1.3406	1.21124
Campus Events	1003	103	1.5434	1.26557
Film/Video Critique	1015	91	1.6325	1.32266
Annotated Bibliography/Webliography	1001	105	1.3177	0.7007
Self Assessment	1008	98	2.4712	1.17537
Field Trips	1006	100	1.8668	0.99258
Service Learning	1000	106	1.939	1.11019
Video Creation	1008	98	1.7222	0.97751
Online Discussion	1010	96	1.8624	1.1324
Reflective Blogs	1007	99	1.3535	0.80267
Online Formative Quizzes	1018	88	2.4322	1.25423
Online Collaborative Projects	1011	95	1.5836	1.30182
Synchronous Online Lecture	1011	95	1.726	1.45939
Participation in Social Networking	1006	100	1.2078	1.28116
Computer-Based Learning Exercises/Games Simulations	1021	85	2.2204	1.44284
Project-based Learning	1012	94	3.3735	1.35156
On-the-Job Training	1009	97	2.1011	1.74053
Work-Based Learning (SAE or SBE)	1006	100	2.0606	1.7803

Appendix F

Most-Used Classroom Instructional Strategies by Frequency Selected

Classroom Instructional Strategies	Frequency Selected	
	Number	Percent
Interactive Lecture	336	32.81%
Lab Activities	290	28.32%
Project-Based Learning	289	28.32%
Guided Practice	235	22.95%
Lecture	224	21.88%
Demonstrations	178	17.38%
Questioning	144	14.06%
Whole Group Discussion	144	14.06%
Problem Based Learning	144	14.06%
Cooperative Learning/Team-Based Learning	105	10.25%
Student Presentations	79	7.71%
Work-based learning (SAE/SBE)	69	6.74%
Computer-Based Learning Exercises/Games Simulations	63	6.15%
Quizzes	61	5.96%
On-the-Job Training	50	4.88%
Small-Group Student Discussions	48	4.69%
Computer Simulations	47	4.59%
Think/Pair/Share	39	3.81%
Self-Directed Learning Background Knowledge Probe/Just-In-Time Teaching	37	3.61%
Student Peer Teaching	34	3.32%
Case Study	29	2.83%
Self Assessment	29	2.83%
Brainstorming	28	2.73%
Review Sessions	27	2.64%
Question & Answer Using Clickers/Personal Response Systems	26	2.54%
Online Formative Quizzes	26	2.54%
Asynchronous Online Lecture	24	2.34%
Synchronous Online Lecture	23	2.25%
Role Play	21	2.05%
Games	18	1.76%
Learning Portfolio	18	1.76%
Personal Reflection Journal	16	1.56%
Online/E-Portfolio	14	1.37%
Guest Lecture	13	1.27%
Major Writing Project/Term Paper	13	1.27%
Concept Maps/ Mind Maps	13	1.27%

	Responses	
Classroom Instructional Strategy	**Number**	**Percent**
Online Discussions	13	1.27%
Film/Video Critique	12	1.17%
Field Trips	11	1.07%
Service Learning	11	1.07%
Video Creation	10	0.98%
Student Peer Assessment	9	0.88%
Short Paper	6	0.59%
Minute Paper/Sentence Summary	5	0.49%
In-Class Informal Writing	5	0.49%
Student-Generated Quiz/Exams	5	0.49%
Online Collaborative Projects	5	0.49%
Original Research Proposal	4	0.39%
Debates	3	0.29%
Student Attitude Survey	2	0.20%
Campus Events	2	0.20%
Reflective Blogs	2	0.20%
Literature Review	1	0.10%
Participation in Social Networking	1	0.10%
Annotated Bibliography/Webliography	0	0.00%
Total Respondents	1,024	

Appendix G

Most-Used Classroom Instructional Strategies by Subject Area

Part 1

Classroom Instructional Strategy	Agriculture Education			Business, Marketing, & Information Technology			Family Consumer Sciences & Human Services			Skilled Technical Sciences		
	Mean	N	Std. Deviation	Mean	N	Std. Deviation	Mean	N	Std. Deviation	Mean	N	Std. Deviation
Questioning	3.807692	104	0.914574	3.818482	303	1.071943	3.938053	226	0.950164	3.966292	89	0.946878
Whole Group Discussion	3.442478	113	0.999447	3.370717	321	1.173782	3.512195	246	1.048738	3.56	100	1.02809
Guided Practice	3.300885	113	0.953237	3.665635	323	1.021338	3.710204	245	0.954765	3.960396	101	0.893541
Interactive Lecture	3.223214	112	1.045883	3.274448	317	1.162607	3.287449	247	1.183544	3.23	100	1.10878
Self-Directed Learning	2.982456	114	1.072442	3.321981	323	1.101261	3.246964	247	1.023971	3.191919	99	1.121922
Major Writing Project	1.690265	113	1.11066	1.558282	326	1.166708	1.576613	248	1.08457	1.06	100	0.951554
Lab Activities	3.389381	113	1.175901	2.780864	324	1.627398	3.918699	246	1.171732	4.2	100	1.180652
Demonstrations	3.342105	114	1.002907	3.307927	328	1.256055	3.558704	247	1.187501	4.183673	98	1.048779
Student Presentations	2.815789	114	1.125456	2.725904	332	1.28206	2.995968	248	1.202218	2.23	100	1.427401
Short Paper	1.75	112	0.96329	1.622222	315	1.148309	1.80083	241	1.033682	1.340426	94	1.042672
Student Peer Assessment	1.785714	112	0.924429	1.741433	321	1.114589	1.971545	246	1.12268	1.979798	99	1.160399
Small-Group Discussion	2.72807	114	0.98919	2.544615	325	1.163492	2.861789	246	1.127216	2.73	100	1.213185
Online Discussions	1.412281	114	1.103585	1.883281	317	1.371825	1.82449	245	1.329756	1.61	100	1.262473
Quizzes	2.859649	114	1.181548	2.727848	316	1.322089	2.674797	246	1.277727	3.17	100	1.231366
Personal Reflection	2.283186	113	1.249779	2.446203	316	1.279987	3.106122	245	1.179123	2.59	100	1.443166
Cooperative Learning	3.017544	114	1.136541	2.801887	318	1.236305	3.491803	244	1.063776	3.29	100	1.208514
Learning Portfolio	1.657895	114	1.444115	1.8875	320	1.508544	2.168033	244	1.612848	1.919192	99	1.595125
Student Attitude Survey	1.368421	114	1.206642	1.408228	316	1.250192	1.682927	246	1.335952	1.7	100	1.321921
Brainstorming	2.654545	110	1.087345	2.818792	298	1.228471	2.969828	232	1.121974	2.903226	93	1.043244
Asynchronous Online	1.635514	107	1.38994	2.47138	297	1.449612	2.2103	233	1.568405	1.557895	95	1.326616
Student Peer Teaching	2.209091	110	1.117792	1.833333	300	1.126849	2.194805	231	1.095909	2.587629	97	1.058227

Classroom Instructional Strategy	Agriculture Education			Business, Marketing, & Information Technology			Family Consumer Sciences & Human Services			Skilled Technical Sciences		
	Mean	N	Std. Deviation	Mean	N	Std. Deviation	Mean	N	Std. Deviation	Mean	N	Std. Deviation
Review Sessions	2.761468	109	1.161888	2.577558	303	1.220584	2.737069	232	1.239608	3.226804	97	1.104019
Literature Review	1.354545	110	1.063026	1.127946	297	1.113702	1.422414	232	1.121617	1.752577	97	1.307279
Online/E-Portfolio	1.045455	110	1.329871	1.523649	296	1.394705	1.482759	232	1.500261	1.197917	96	1.411381
Case Study	1.436364	110	1.267283	2.145215	303	1.286211	1.93133	233	1.187037	1.546392	97	1.414365
Lecture	3.070423	71	1.099662	2.788889	180	1.223553	2.751773	141	1.153603	3.19697	66	1.16645
Question & Answer using clickers/Personal Response Systems	1.453704	108	1.255896	1.382239	259	1.379752	1.493213	221	1.416205	1.273684	95	1.432466
Guest Lecture	1.872727	110	0.857873	1.622222	270	1.004574	1.813636	220	1.00082	1.829787	94	0.82486
Think/Pair/Share	2.240741	108	1.117995	1.862595	262	1.211461	2.339207	227	1.253104	1.827957	93	1.356335
Minute Paper/Sentence Summary	1.418182	110	1.191575	1.040741	270	1.148058	1.458874	231	1.304439	1.117021	94	1.285623
Problem Based Learning	3.1	110	1.298906	3.15625	288	1.279657	2.95671	231	1.218636	3.431579	95	1.25183
Role Play	1.545455	110	1.275286	1.745645	287	1.359288	1.869565	230	1.311832	1.305263	95	1.345392
Games	2.313725	102	1.15167	2.141762	261	1.156511	2.445	200	1.082977	1.841463	82	1.337674
Computer Simulations	1.818182	110	1.190034	2.614094	298	1.341667	1.701299	231	1.237792	1.83871	93	1.312899
Debates	1.759259	108	0.994098	1.310345	290	1.143764	1.28	225	1.011894	1.393617	94	1.165988
In-Class Informal Writing	1.845455	110	1.212975	1.630508	295	1.2132	1.844828	232	1.105699	1.117021	94	1.162648
Original Research Proposal	1.172727	110	1.156228	0.976431	297	1.101036	1.034483	232	1.07253	0.778947	95	0.991227
Student-Generated Quiz/Exams	1.281818	110	1.174123	0.912458	297	1.156246	1.082251	231	1.133362	0.736842	95	1.03359
Concept Maps/Mind Maps	1.472727	110	1.170816	1.122867	293	1.059169	1.441558	231	1.159012	0.926316	95	1.265265
Campus Events	1.7	110	1.281842	1.338983	295	1.253704	1.633188	229	1.296398	1.631579	95	1.296908
Film/Video Critique	1.581818	110	1.294886	1.458472	301	1.252638	1.818966	232	1.195947	1.578947	95	1.462866

Classroom Instructional Strategy	Agriculture Education			Business, Marketing, & Information Technology			Family Consumer Sciences & Human Services			Skilled Technical Sciences		
	Mean	N	Std. Deviation	Mean	N	Std. Deviation	Mean	N	Std. Deviation	Mean	N	Std. Deviation
Annotated Bibliography/ Webliography	1.407407	108	0.71089	1.208754	297	0.566692	1.418502	227	0.784931	1.085106	94	0.316553
Self Assessment	2.174312	109	1.070168	2.274576	295	1.149918	2.756522	230	1.226286	2.43617	94	1.196397
Field Trips	2.281818	110	1.150443	1.612795	297	0.847236	1.86087	230	1.005548	1.884211	95	0.848818
Service Learning	2.163636	110	1.096511	1.664384	292	0.975841	2.157895	228	1.157842	1.893617	94	1.052065
Video Creation	1.605505	109	0.98148	1.769492	295	0.993731	1.771552	232	0.9138	1.536842	95	0.943178
Online Discussion	1.454545	110	0.852803	2.074074	297	1.238965	1.830435	230	1.094622	1.578947	95	0.940563
Reflective Blogs	1.290909	110	0.827791	1.37415	294	0.79427	1.441558	231	0.882095	1.168421	95	0.558353
Online Formative Quizzes	2.218182	110	1.176075	2.543046	302	1.250834	2.409483	232	1.289483	2.105263	95	1.233173
Online Collaborative Projects	1.463636	110	1.209119	1.821549	297	1.362557	1.637931	232	1.258024	0.894737	95	1.224516
Synchronous Online Lecture	1.53211	109	1.391567	1.866221	299	1.502402	1.643478	230	1.457948	1.297872	94	1.310256
Participation in Social Networking	1.284404	109	1.179232	1.320819	293	1.362214	1.193133	233	1.273586	0.9375	96	1.093642
Computer-Based Learning Exercises/Games Simulations	1.779817	109	1.189131	2.639073	302	1.460054	1.965665	233	1.35463	1.697917	96	1.385031
Project-based Learning	3.254545	110	1.31635	3.397306	297	1.288092	3.24569	232	1.301008	3.389474	95	1.510916
On-the-Job Training	2.318182	110	1.489608	1.539249	293	1.609899	2.150862	232	1.791901	3.03125	96	1.559036
Work-based Learning (SAE or SBE)	3.3	110	1.281842	1.614334	293	1.703562	1.813043	230	1.803636	2.645833	96	1.660559

Part 2

Classroom Instructional Strategy	Health Sciences			Engineering and Technology Education			Total		
	Mean	N	Std. Deviation	Mean	N	Std. Deviation	Mean	N	Std. Deviation
Questioning	4.008696	115	0.912829	3.892405	158	0.98773	3.891457	995	0.986976
Whole Group Discussion	3.642276	123	1.056829	3.216374	171	1.180713	3.434823	1074	1.108275
Guided Practice	3.663934	122	1.041381	3.80117	171	0.997762	3.686512	1075	0.996901
Interactive Lecture	3.512195	123	1.089186	2.971098	173	1.245586	3.246269	1072	1.163154
Self-Directed Learning	3.270492	122	1.068225	3.244186	172	1.07536	3.238626	1077	1.076823
Major Writing Project	1.793388	121	1.079486	1.283237	173	1.144048	1.512488	1081	1.126319
Lab Activities	3.846774	124	1.044103	4.095808	167	1.082353	3.565177	1074	1.413534
Demonstrations	3.717742	124	1.200003	3.845714	175	1.074346	3.581031	1086	1.192283
Student Presentations	2.975806	124	1.143833	2.514286	175	1.312439	2.745654	1093	1.271443
Short Paper	1.866667	120	1.020243	1.343195	169	1.069309	1.634634	1051	1.081313
Student Peer Assessment	2.322581	124	1.284988	2.218391	174	1.248586	1.964684	1076	1.162458
Small-Group Discussion	2.91129	124	1.097018	2.710983	173	1.1298	2.721811	1082	1.135283
Online Discussions	2.131148	122	1.366366	1.649425	174	1.307194	1.784515	1072	1.326038
Quizzes	3.487805	123	1.074029	2.787356	174	1.261095	2.867661	1073	1.276659
Personal Reflection	2.819672	122	1.21299	2.569767	172	1.261584	2.656367	1068	1.288289
Cooperative Learning	3.3	120	1.149351	3.201149	174	1.249184	3.148598	1070	1.204673
Learning Portfolio	1.95935	123	1.564977	2.302326	172	1.556498	2.004664	1072	1.557182
Student Attitude Survey	1.894309	123	1.475555	1.653179	173	1.457121	1.589552	1072	1.342198
Brainstorming	2.889908	109	1.242306	3.109091	165	1.23968	2.898709	1007	1.181227
Asynchronous Online	2.590909	110	1.370029	2.347305	167	1.422403	2.22894	1009	1.483412
Student Peer Teaching	2.4375	112	1.183834	2.386905	168	1.285225	2.185658	1018	1.172409

Classroom Instructional Strategy	Health Sciences			Engineering and Technology Education			Total		
	Mean	N	Std. Deviation	Mean	N	Std. Deviation	Mean	N	Std. Deviation
Review Sessions	3.36036	111	1.042661	2.708333	168	1.144391	2.801961	1020	1.203526
Literature Review	1.783784	111	1.337606	1.353659	164	1.212126	1.388724	1011	1.190819
Online/E-Portfolio	1.535714	112	1.541782	1.706587	167	1.572778	1.462981	1013	1.470346
Case Study	2.864865	111	1.261215	1.610778	167	1.298054	1.953967	1021	1.334621
Lecture	3.127273	55	1.233101	2.663551	107	1.280801	2.864516	620	1.208892
Question & Answer using clickers/Personal Response Systems	1.963636	110	1.56174	1.312883	163	1.433813	1.460251	956	1.421411
Guest Lecture	1.963303	109	1.23173	1.68323	161	1.008851	1.763485	964	1.005734
Think/Pair/Share	2.378378	111	1.368835	1.8875	160	1.312674	2.078044	961	1.280115
Minute Paper/Sentence Summary	1.458716	109	1.469014	1.030675	163	1.183338	1.234391	977	1.261555
Problem Based Learning	3.252252	111	1.224511	3.798817	169	1.126414	3.249004	1004	1.262919
Role Play	2.697248	109	1.280224	1.552147	163	1.427911	1.782696	994	1.385823
Games	2.608696	92	1.166911	1.580645	155	1.167031	2.152466	892	1.20384
Computer Simulations	2.136364	110	1.252354	2.284024	169	1.460526	2.140455	1011	1.358528
Debates	1.623853	109	1.136833	1.091463	164	1.07289	1.358586	990	1.104134
In-Class Informal Writing	1.810811	111	1.171739	1.451807	166	1.152374	1.645833	1008	1.187724
Original Research Proposal	1.189189	111	1.074612	1.048193	166	1.143134	1.027695	1011	1.097804
Student-Generated Quiz/Exams	1.557522	113	1.362364	0.915663	166	1.119576	1.047431	1012	1.180841
Concept Maps/Mind Maps	1.954955	111	1.377662	1.323171	164	1.238126	1.340637	1004	1.211239
Campus Events	1.672727	110	1.234884	1.542683	164	1.205054	1.54337	1003	1.265567
Film/Video Critique	1.927928	111	1.332883	1.554217	166	1.487345	1.632512	1015	1.322662
Annotated Bibliography/Webliography	1.418182	110	0.828194	1.381818	165	0.799945	1.317682	1001	0.700698

Classroom Instructional Strategy	Health Sciences			Engineering and Technology Education			Total		
	Mean	N	Std. Deviation	Mean	N	Std. Deviation	Mean	N	Std. Deviation
Self Assessment	2.59292	113	1.146712	2.556886	167	1.127984	2.47123	1008	1.17537
Field Trips	2.12844	109	1.114724	1.872727	165	0.970062	1.866799	1006	0.992585
Service Learning	2.306306	111	1.270596	1.751515	165	1.044183	1.939	1000	1.110185
Video Creation	1.801802	111	0.932444	1.698795	166	1.070089	1.722222	1008	0.977514
Online Discussion	2.126126	111	1.272914	1.784431	167	1.03038	1.862376	1010	1.1324
Reflective Blogs	1.423423	111	0.869164	1.295181	166	0.740746	1.353525	1007	0.80267
Online Formative Quizzes	2.963964	111	1.205502	2.238095	168	1.184926	2.43222	1018	1.254225
Online Collaborative Projects	1.603604	111	1.208149	1.542169	166	1.282055	1.583581	1011	1.301822
Synchronous Online Lecture	2.072072	111	1.469148	1.72619	168	1.433986	1.726014	1011	1.459386
Participation in Social Networking	1.405405	111	1.460874	1	164	1.135052	1.207753	1006	1.281161
Computer-Based Learning Exercises/Games Simulations	2.548673	113	1.457684	2.184524	168	1.458569	2.220372	1021	1.442838
Project-based Learning	2.901786	112	1.413958	3.89759	166	1.263135	3.373518	1012	1.351561
On-the-Job Training	2.491071	112	1.98642	2.078313	166	1.644056	2.10109	1009	1.740532
Work-based Learning (SAE or SBE)	2.163636	110	1.874636	1.964072	167	1.721208	2.060636	1006	1.780296

Appendix H

Classroom Instructional Strategy Use Differences by Region

Classroom Instructional Strategy	Northeast		South		Midwest		Pacific		Total
	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank	Total
Questioning	59	552.38	320	490.25	413	477.56	190	505.01	982
Whole Group Discussion	66	522.51	345	549.42	446	532.19	203	497.24	1060
Guided Practice	68	540.29	343	530.18	445	536.60	205	517.13	1061
Interactive Lecture	67	476.63	341	528.56	449	537.61	202	533.23	1059
Self-Directed Learning	66	511.90	348	563.49	448	518.78	202	516.26	1064
Major Writing Project	65	577.39	348	558.28	449	508.62	205	534.61	1067
Lab Activities	68	536.74	342	527.51	451	533.00	201	533.16	1062
Demonstrations	68	636.94	348	540.56	452	512.67	205	551.44	1073
Student Presentations	71	648.98	345	551.51	458	514.31	205	540.27	1079
Short Paper	63	606.74	332	514.72	442	507.39	200	524.14	1037
Student Peer Assessment	67	572.09	346	536.09	444	506.26	205	565.17	1062
Small-Group Discussion	66	572.17	347	534.89	451	526.16	204	540.10	1068
Online Discussions	66	659.08	344	533.82	444	505.66	204	532.16	1058
Quizzes	65	474.79	345	568.98	446	507.33	203	531.23	1059
Personal Reflection	63	600.35	343	536.70	446	501.88	204	550.71	1056
Cooperative Learning	65	541.09	344	529.55	448	521.81	199	537.64	1056
Learning Portfolio	67	629.51	345	568.54	444	486.45	203	526.90	1059
Student Attitude Survey	67	583.24	344	555.78	446	482.28	202	573.81	1059
Brainstorming	60	553.63	319	515.00	420	488.67	195	470.62	994
Asynchronous Online	61	561.63	318	523.42	421	452.14	195	535.65	995
Student Peer Teaching	62	523.96	323	514.99	426	486.63	194	512.28	1005
Review Sessions	61	470.93	322	534.00	430	489.26	193	494.62	1006
Literature Review	61	563.71	320	532.74	424	486.83	193	451.93	998
Online/E-Portfolio	61	591.49	321	538.83	425	475.11	193	463.90	1000
Case Study	63	580.42	321	518.34	430	498.40	193	467.68	1007
Lecture	34	306.34	204	316.79	253	303.88	123	299.86	614

Classroom Instructional Strategy	Northeast		South		Midwest		Pacific		Total
	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank	Total
Question & Answer Using clickers/Personal Response Systems	54	496.90	307	496.41	396	449.96	185	468.86	942
Guest Lecture	56	509.66	307	485.53	398	458.18	189	485.56	950
Think/Pair/Share	56	528.46	310	473.55	396	456.92	185	494.82	947
Minute Paper/Sentence Summary	57	479.61	315	500.43	403	468.06	189	484.28	964
Problem Based Learning	65	541.60	318	489.62	416	500.54	191	478.62	990
Role Play	60	518.52	317	520.85	414	473.58	190	470.47	981
Games	52	428.91	280	452.23	369	427.72	178	449.47	879
Computer Simulations	61	498.43	321	518.48	424	503.28	192	459.75	998
Debates	58	471.59	317	526.85	413	479.68	189	451.23	977
In-Class Informal Writing	60	540.89	321	512.20	422	489.43	193	482.37	996
Original Research Proposal	61	577.39	321	514.38	424	469.76	192	515.54	998
Student-Generated Quiz/Exams	60	545.47	322	516.50	423	491.13	193	475.18	998
Concept Maps/Mind Maps	58	489.01	321	507.24	422	479.54	190	515.70	991
Campus Events	59	474.90	318	549.92	421	443.25	191	523.84	989
Film/Video Critique	63	597.25	321	505.12	428	482.54	190	506.35	1002
Annotated Bibliography/Webliography	59	493.37	321	500.97	417	493.33	191	486.53	988
Self Assessment	61	556.61	319	486.76	422	492.33	192	507.92	994
Field Trips	58	544.12	319	510.74	425	493.65	190	464.43	992
Service Learning	58	542.57	321	525.58	418	474.59	190	468.51	987
Video Creation	59	525.00	321	508.27	425	475.57	191	524.91	996
Online Discussion	60	599.94	321	528.99	424	460.07	192	503.28	997
Reflective Blogs	58	516.76	322	510.02	425	491.60	189	483.53	994
Online Formative Quizzes	62	505.45	322	540.53	427	487.98	193	470.23	1004
Online Collaborative Projects	60	572.98	322	510.48	420	487.41	195	482.26	997
Synchronous Online Lecture	61	606.89	317	533.20	424	438.01	195	542.26	997
Participation in Social Networking	58	444.51	319	553.95	423	461.29	193	496.91	993

Classroom Instructional Strategy	Northeast		South		Midwest		Pacific		Total
	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank	Total
Computer-Based Learning Exercises/Games Simulations	62	512.02	325	534.24	426	494.06	194	472.60	1007
Project-based Learning	61	541.23	321	497.82	423	489.76	194	512.98	999
On-the-Job Training	60	524.68	322	515.33	422	499.08	192	460.83	996
Work-based Learning (SAE or SBE)	59	514.37	319	509.15	423	494.21	192	477.64	993

Appendix I

Top Strategies by Type of School

Part 1

				Area Career Center			Comprehensive High School		
Classroom Instructional Strategy	N		Sum	N		Sum	N		Sum
	Valid	Missing		Valid	Missing		Valid	Missing	
Lecture	1	11	1.00	58	232	58.00	140	564	140.00
Interactive Lecture	5	7	5.00	73	217	73.00	230	474	230.00
Questioning	2	10	2.00	32	258	32.00	94	610	94.00
Question & Answer Using Clickers/Personal Response Systems	0	12		6	284	6.00	17	687	17.00
Guest Lecture	0	12		2	288	2.00	10	694	10.00
Think/Pair/Share	0	12		8	282	8.00	25	679	25.00
Guided Practice	2	10	2.00	68	222	68.00	148	556	148.00
Whole Group Discussion	0	12		32	258	32.00	98	606	98.00
Small-Group Student Discussions	0	12		14	276	14.00	27	677	27.00
Minute Paper/Sentence Summary	0	12		1	289	1.00	4	700	4.00
Brainstorming	0	12		7	283	7.00	17	687	17.00
Student Peer Teaching	0	12		13	277	13.00	20	684	20.00
Cooperative Learning/Team-Based Learning	3	9	3.00	31	259	31.00	67	637	67.00
Student Presentations	0	12		13	277	13.00	54	650	54.00
Demonstrations	0	12		59	231	59.00	104	600	104.00
Problem Based Learning	4	8	4.00	22	268	22.00	108	596	108.00
Role Play	0	12		11	279	11.00	10	694	10.00
Games	1	11	1.00	4	286	4.00	11	693	11.00
Computer Simulations	0	12		14	276	14.00	29	675	29.00
Lab Activities	4	8	4.00	89	201	89.00	171	533	171.00
Debates	0	12		0	290		3	701	3.00
In-Class Informal Writing	0	12		1	289	1.00	4	700	4.00
Quizzes	0	12		12	278	12.00	39	665	39.00
Review Sessions	0	12		6	284	6.00	17	687	17.00
Case Study	0	12		3	287	3.00	23	681	23.00
Literature Review	0	12		0	290		1	703	1.00
Original Research Proposal	0	12		1	289	1.00	3	701	3.00
				Area Career Center			Comprehensive High School		

Classroom Instructional Strategy	N		Sum	N		Sum	N		Sum
	Valid	Missing		Valid	Missing		Valid	Missing	
Short Paper	0	12		3	287	3.00	1	703	1.00
Major Writing Project/Term Paper	0	12		1	289	1.00	7	697	7.00
Student-Generated Quiz/Exams	0	12		2	288	2.00	2	702	2.00
Concept Maps/ Mind Maps	0	12		4	286	4.00	8	696	8.00
Student Attitude Survey	0	12		1	289	1.00	1	703	1.00
Campus Events	1	11	1.00	0	290		1	703	1.00
Film/Video Critique	0	12		2	288	2.00	6	698	6.00
Annotated Bibliography/Webliography	0	12		0	290		0	704	
Self Assessment	0	12		8	282	8.00	18	686	18.00
Personal Reflection Journal	0	12		3	287	3.00	11	693	11.00
Learning Portfolio	0	12		3	287	3.00	13	691	13.00
Field Trips	0	12		2	288	2.00	8	696	8.00
Service Learning	2	10	2.00	2	288	2.00	6	698	6.00
Video Creation	0	12		1	289	1.00	8	696	8.00
Student Peer Assessment	0	12		3	287	3.00	5	699	5.00
Online Discussions	0	12		3	287	3.00	5	699	5.00
Reflective Blogs	0	12		2	288	2.00	0	704	
Online Formative Quizzes	0	12		8	282	8.00	17	687	17.00
Online Collaborative Projects	0	12		1	289	1.00	3	701	3.00
Synchronous Online Lecture	0	12		3	287	3.00	17	687	17.00
Asynchronous Online Lecture	0	12		2	288	2.00	17	687	17.00
Participation in Social Networking	0	12		0	290		1	703	1.00
Online/E-Portfolio	1	11	1.00	1	289	1.00	11	693	11.00
Self-Directed Learning, Background knowledge Probe/Just-In-Time Teaching	0	12		9	281	9.00	26	678	26.00
Computer-Based Learning Exercises/Games Simulations	2	10	2.00	16	274	16.00	40	664	40.00
Project-Based Learning	5	7	5.00	82	208	82.00	179	525	179.00
On-the-Job Training	0	12		23	267	23.00	24	680	24.00
Work-based learning (SAE/SBE)	0	12		27	263	27.00	37	667	37.00

Part 2

	Community College			4-year University			I am not sure		
Classroom Instructional Strategy	N		Sum	N			N		Sum
	Valid	Missing		Valid	Missing	Sum	Valid	Missing	
Lecture	12	37	12.00	3	19	3.00	9	20	9.00
Interactive Lecture	17	32	17.00	4	18	4.00	7	22	7.00
Questioning	6	43	6.00	4	18	4.00	6	23	6.00
Question & Answer using clickers/Personal Response Systems	0	49		0	22		3	26	3.00
Guest Lecture	0	49		0	22		1	28	1.00
Think/Pair/Share	2	47	2.00	1	21	1.00	3	26	3.00
Guided Practice	7	42	7.00	3	19	3.00	7	22	7.00
Whole Group Discussion	7	42	7.00	4	18	4.00	3	26	3.00
Small-Group Student Discussions	3	46	3.00	3	19	3.00	1	28	1.00
Minute Paper/Sentence Summary	0	49		0	22		0	29	
Brainstorming	1	48	1.00	0	22		3	26	3.00
Student peer Teaching	1	48	1.00	0	22		0	29	
Cooperative Learning/Team-Based Learning	2	47	2.00	0	22		2	27	2.00
Student Presentations	5	44	5.00	5	17	5.00	2	27	2.00
Demonstrations	9	40	9.00	2	20	2.00	4	25	4.00
Problem Based Learning	5	44	5.00	2	20	2.00	3	26	3.00
Role Play	0	49		0	22		0	29	
Games	0	49		0	22		2	27	2.00
Computer Simulations	3	46	3.00	0	22		1	28	1.00
Lab Activities	14	35	14.00	3	19	3.00	9	20	9.00
Debates	0	49		0	22		0	29	
In-Class Informal Writing	0	49		0	22		0	29	
Quizzes	8	41	8.00	1	21	1.00	1	28	1.00
Review Sessions	3	46	3.00	0	22		1	28	1.00
Case Study	2	47	2.00	1	21	1.00	0	29	
Literature Review	0	49		0	22		0	29	
Original Research Proposal	0	49		0	22		0	29	
Short Paper	2	47	2.00	0	22		0	29	

	Community College			4-year University			I am not sure		
Classroom Instructional Strategy	N		Sum	N			N		Sum
	Valid	Missing		Valid	Missing	Sum	Valid	Missing	
Major Writing Project/Term Paper	1	48	1.00	4	18	4.00	0	29	
Student-Generated Quiz/Exams	0	49		0	22		0	29	
Concept Maps/ Mind Maps	0	49		1	21	1.00	0	29	
Student Attitude Survey	0	49		0	22		0	29	
Campus Events	0	49		0	22		0	29	
Film/Video Critique	3	46	3.00	1	21	1.00	0	29	
Annotated Bibliography/Webliography	0	49		0	22		0	29	
Self Assessment	2	47	2.00	1	21	1.00	0	29	
Personal Reflection Journal	1	48	1.00	1	21	1.00	0	29	
Learning Portfolio	1	48	1.00	0	22		1	28	1.00
Field Trips	1	48	1.00	0	22		0	29	
Service Learning	0	49		1	21	1.00	0	29	
Video Creation	0	49		1	21	1.00	0	29	
Student Peer Assessment	0	49		0	22		1	28	1.00
Online Discussions	2	47	2.00	2	20	2.00	1	28	1.00
Reflective Blogs	0	49		0	22		0	29	
Online Formative Quizzes	0	49		1	21	1.00	0	29	
Online Collaborative Projects	1	48	1.00	0	22		0	29	
Synchronous Online Lecture	1	48	1.00	2	20	2.00	0	29	
Asynchronous Online Lecture	3	46	3.00	2	20	2.00	0	29	
Participation in Social Networking	0	49		0	22		0	29	
Online/E-Portfolio	1	48	1.00	0	22		0	29	
Self-Directed Learning, Background knowledge Probe/Just-In-Time Teaching	0	49		0	22		2	27	2.00
Computer-Based Learning Exercises/Games Simulations	2	47	2.00	0	22		3	26	3.00
Project-Based Learning	13	36	13.00	4	18	4.00	6	23	6.00
On-the-Job Training	3	46	3.00	0	22		0	29	
Work-based learning (SAE/SBE)	3	46	3.00	0	22		2	27	2.00

Appendix J

Teachers With and Without a Person of Significance Data

	Yes		No		I prefer not to answer		
Classroom Instructional Strategy	**N**	**Mean Rank**	**N**	**Mean Rank**	**N**	**Mean Rank**	**Total**
Questioning	611	499.43	383	495.69	1	508.00	995
Whole Group Discussion	661	540.77	409	533.64	4	391.00	1074
Guided Practice	660	542.10	411	531.38	4	541.25	1075
Interactive Lecture	659	549.53	409	518.34	4	247.00	1072
Self-Directed Learning	664	542.73	409	535.98	4	229.50	1077
Major Writing Project	669	550.18	409	527.82	3	291.33	1081
Lab Activities	657	536.37	413	540.09	4	454.75	1074
Demonstrations	668	537.50	415	551.76	3	736.67	1086
Student Presentations	671	549.43	418	540.63	4	806.00	1093
Short Paper	644	526.72	403	526.00	4	409.75	1051
Student Peer Assessment	661	534.32	411	543.56	4	708.63	1076
Small-Group Discussion	665	535.34	413	551.41	4	541.88	1082
Online Discussions	660	525.71	408	553.67	4	566.38	1072
Quizzes	656	536.07	413	537.08	4	681.38	1073
Personal Reflection	658	543.42	407	520.15	3	526.00	1068
Cooperative Learning	657	537.78	410	532.19	3	487.50	1070
Learning Portfolio	655	542.34	412	527.08	5	547.30	1072
Student Attitude Survey	658	543.70	411	525.89	3	412.00	1072
Brainstorming	629	511.06	375	493.41	3	347.50	1007
Asynchronous Online	628	508.26	377	501.19	4	352.25	1009
Student Peer Teaching	638	520.38	377	492.17	3	373.17	1018
Review Sessions	637	518.27	379	497.98	4	459.50	1020
Literature Review	630	500.53	377	515.49	4	473.50	1011
Online/E-Portfolio	635	519.71	375	485.17	3	546.00	1013
Case Study	639	506.67	377	519.36	5	434.40	1021
Lecture	390	320.39	228	295.59	2	82.00	620
Question & Answer Using Clickers/Personal Response Systems	604	484.16	348	469.37	4	418.63	956
Guest Lecture	612	485.72	348	477.47	4	427.75	964
Think/Pair/Share	604	493.90	354	459.09	3	468.50	961
Minute Paper/Sentence Summary	613	503.96	361	464.43	3	388.83	977
Problem Based Learning	630	492.36	369	519.21	5	546.60	1004

	Yes		No		I prefer not to answer		
Classroom Instructional Strategy	**N**	**Mean Rank**	**N**	**Mean Rank**	**N**	**Mean Rank**	**Total**
Role Play	623	504.54	368	486.27	3	414.00	994
Games	562	463.29	328	417.17	2	539.00	892
Computer Simulations	633	505.16	374	503.60	4	863.50	1011
Debates	619	505.27	367	479.91	4	414.13	990
In-Class Informal Writing	630	511.13	374	494.35	4	409.63	1008
Original Research Proposal	631	501.40	376	513.40	4	535.00	1011
Student-Generated Quiz/Exams	632	515.65	377	491.62	3	449.67	1012
Concept Maps/Mind Maps	626	512.31	375	485.85	3	537.17	1004
Campus Events	626	504.63	374	497.96	3	457.83	1003
Film/Video Critique	633	518.04	377	488.78	5	686.40	1015
Annotated Bibliography/Webliography	623	504.65	374	496.07	4	393.00	1001
Self Assessment	630	504.42	375	505.45	3	402.83	1008
Field Trips	625	507.66	377	495.75	4	583.38	1006
Service Learning	626	497.82	371	504.60	3	553.00	1000
Video Creation	626	511.05	379	492.79	3	616.67	1008
Online Discussion	630	500.13	376	512.06	4	734.38	1010
Reflective Blogs	630	502.94	374	505.43	3	549.17	1007
Online Formative Quizzes	637	513.34	378	505.14	3	244.17	1018
Online Collaborative Projects	629	510.23	378	498.65	4	536.38	1011
Synchronous Online Lecture	632	506.03	376	506.51	3	436.50	1011
Participation in Social Networking	628	511.47	375	490.90	3	410.67	1006
Computer-Based Learning Exercises/Games Simulations	637	512.03	380	507.24	4	703.75	1021
Project-based Learning	632	508.94	376	503.50	4	403.13	1012
On-the-Job Training	632	502.53	374	511.58	3	204.67	1009
Work-based Learning (SAE or SBE)	631	509.23	371	496.92	4	209.50	1006

Appendix K

Classroom Instructional Strategies by Teaching Certification Route

	Traditional method through a 4-year University with student teaching		Alternative or Innovative Certification method		Career Education Certification method: Traditional CTE coursework		Career Education Certification method: CTTE cohort courses		
Classroom Strategy	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank	Total
Questioning	512	492.17	200	471.01	207	528.50	76	525.26	995
Whole Group Discussion	551	528.40	214	511.67	222	577.39	87	556.87	1074
Guided Practice	554	538.84	212	480.35	222	580.86	87	563.78	1075
Interactive Lecture	550	530.63	211	503.87	223	584.04	88	530.95	1072
Self-Directed Learning	554	541.59	214	557.88	222	548.88	87	450.83	1077
Major Writing Project	555	543.87	214	533.03	224	554.59	88	507.71	1081
Lab Activities	552	505.53	212	512.41	221	618.04	89	595.56	1074
Demonstrations	560	501.65	211	503.60	227	639.54	88	657.77	1086
Student Presentations	563	552.43	214	534.14	227	551.91	89	531.07	1093
Short Paper	544	517.85	207	519.97	216	564.76	84	493.97	1051
Student Peer Assessment	551	534.08	214	512.08	224	584.13	87	514.00	1076
Small-Group Discussion	556	548.18	215	497.59	224	563.35	87	551.03	1082
Online Discussions	549	529.79	214	509.93	222	570.04	87	558.60	1072
Quizzes	546	496.44	215	544.40	225	621.08	87	555.81	1073
Personal Reflection	545	528.56	212	538.40	223	555.14	88	509.61	1068
Cooperative Learning	550	539.40	212	522.96	221	536.54	87	538.80	1070
Learning Portfolio	551	529.87	213	510.40	222	580.68	86	529.56	1072
Student Attitude Survey	550	517.72	212	518.34	222	606.69	88	520.59	1072
Brainstorming	524	504.83	198	501.33	206	494.49	79	529.94	1007
Asynchronous Online	522	496.34	202	521.45	205	524.49	80	470.04	1009
Student Peer Teaching	524	503.85	201	474.18	212	537.47	81	560.48	1018
Review Sessions	527	488.72	203	468.45	208	578.78	82	581.36	1020
Literature Review	524	477.20	201	481.69	206	562.26	80	610.83	1011
Online/E-Portfolio	525	494.02	201	524.55	206	528.58	81	492.69	1013
Case Study	530	497.44	201	522.27	208	529.23	82	524.77	1021
Lecture	317	286.70	123	302.67	123	351.61	57	371.06	620

	Traditional method through a 4-year University with student teaching		Alternative or Innovative Certification method		Career Education Certification method: Traditional CTE coursework		Career Education Certification method: CTTE cohort courses		
Classroom Strategy	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank	Total
Question & Answer Using Clickers/Personal Response Systems	485	471.24	191	460.33	203	511.15	77	483.23	956
Guest Lecture	494	470.89	189	455.71	201	520.25	80	522.64	964
Think/Pair/Share	491	496.69	188	463.04	204	474.25	78	443.21	961
Minute Paper/Sentence Summary	507	498.48	190	468.59	200	496.47	80	458.69	977
Problem Based Learning	513	495.34	200	496.89	210	523.08	81	508.38	1004
Role Play	513	469.40	196	505.51	203	555.88	82	509.61	994
Games	468	448.64	171	470.56	182	437.95	71	396.36	892
Computer Simulations	522	502.45	201	555.22	209	475.11	79	485.94	1011
Debates	514	496.55	196	471.92	199	491.39	81	555.99	990
In-Class Informal Writing	520	518.07	201	502.84	206	492.96	81	450.88	1008
Original Research Proposal	525	502.54	200	486.99	204	531.16	82	511.92	1011
Student-Generated Quiz/Exams	525	510.27	197	465.15	209	527.12	81	529.42	1012
Concept Maps/Mind Maps	520	532.75	199	464.23	204	476.01	81	469.04	1004
Campus Events	522	481.49	196	484.55	204	552.86	81	548.30	1003
Film/Video Critique	526	513.33	201	481.27	207	503.30	81	551.73	1015
Annotated Bibliography/Webliography	520	513.35	198	497.09	204	480.76	79	481.73	1001
Self Assessment	523	501.74	198	483.88	207	540.07	80	481.54	1008
Field Trips	522	498.98	200	483.31	204	517.00	80	549.06	1006
Service Learning	520	499.28	199	453.65	201	547.54	80	506.76	1000
Video Creation	523	500.22	199	507.09	205	499.66	81	538.01	1008
Online Discussion	522	495.00	198	502.79	209	539.46	81	492.17	1010
Reflective Blogs	523	501.93	198	512.23	205	505.92	81	492.35	1007

	Traditional method through a 4-year University with student teaching		Alternative or Innovative Certification method		Career Education Certification method: Traditional CTE coursework		Career Education Certification method: CTTE cohort courses		
Classroom Strategy	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank	Total
Online Formative Quizzes	529	489.36	200	529.38	207	547.03	82	496.20	1018
Online Collaborative Projects	525	520.66	199	522.96	207	472.97	80	453.08	1011
Synchronous Online Lecture	525	489.83	199	520.81	206	541.32	81	484.56	1011
Participation in Social Networking	523	500.84	197	479.48	205	538.55	81	490.38	1006
Computer-Based Learning Exercises/Games Simulations	528	507.24	203	551.53	209	495.68	81	473.42	1021
Project-Based Learning	527	504.61	199	517.01	206	493.89	80	525.29	1012
On-the-Job Training	524	487.05	198	433.46	206	592.03	81	574.65	1009
Work-Based Learning (SAE or SBE)	523	504.81	199	423.05	205	561.89	79	545.96	1006

Appendix L

Classroom Instructional Strategy Use by Years of Experience

Part 1

	0-3 years		4-7 years		8-11 years		12-15 years	
	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank
Questioning	11	448.54	155	494.30	130	499.13	112	477.88
Whole Group Discussion	12	529.61	166	555.35	140	541.75	132	530.72
Guided Practice	12	440.75	164	536.52	142	494.44	130	529.32
Interactive Lecture	12	545.80	167	543.62	141	526.45	128	538.92
Self-Directed Learning	12	485.92	168	510.98	139	507.79	130	582.08
Major Writing Project	12	489.33	167	512.07	141	548.56	130	525.60
Lab Activities	12	469.46	165	532.19	143	482.30	129	535.29
Demonstrations	12	487.96	166	545.62	141	547.55	132	548.17
Student Presentations	12	490.15	167	532.34	145	572.71	132	527.22
Short Paper	12	470.05	165	517.21	136	548.36	127	508.61
Student Peer Assessment	12	445.64	165	576.06	139	549.92	131	532.36
Small-Group Discussion	12	481.48	166	577.82	140	547.14	132	542.91
Online Discussions	12	476.60	165	583.25	141	547.89	132	540.50
Quizzes	12	505.52	166	543.20	139	519.21	131	566.21
Personal Reflection	12	486.63	165	584.16	140	552.17	131	496.08
Cooperative Learning	12	470.14	164	545.61	141	545.02	131	543.48
Learning Portfolio	12	400.96	163	533.45	141	565.00	131	549.61
Student Attitude Survey	12	519.09	164	529.70	142	513.92	131	504.76
Brainstorming	11	452.13	154	536.50	127	506.95	123	489.96
Asynchronous Online	11	504.62	153	497.15	131	518.66	123	507.12
Student Peer Teaching	11	462.42	156	508.46	131	513.56	124	516.40
Review Sessions	11	512.14	155	487.84	131	499.02	124	532.40
Literature Review	11	504.96	154	534.41	131	538.11	125	485.47
Online/E-Portfolio	11	428.99	153	522.81	128	561.74	124	518.74
Case Study	11	483.62	155	533.28	132	526.84	124	505.49
Lecture	8	332.65	103	338.02	83	314.90	65	302.09

	0-3 years		4-7 years		8-11 years		12-15 years	
	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank
Question & Answer using clickers/Personal Response Systems	10	487.70	151	508.06	122	478.25	118	458.14
Guest Lecture	10	385.61	150	508.94	128	474.50	116	460.01
Think/Pair/Share	10	411.59	155	498.63	120	478.60	118	473.03
Minute Paper/Sentence Summary	10	472.61	155	501.50	123	496.30	118	461.97
Problem Based Learning	10	423.41	154	472.66	130	533.43	123	545.75
Role Play	11	501.50	152	537.45	129	503.29	123	447.72
Games	10	467.96	143	471.69	115	455.04	104	412.61
Computer Simulations	11	469.50	154	502.13	131	514.24	124	507.86
Debates	11	505.23	154	539.52	126	495.83	120	466.73
In-Class Informal Writing	11	431.00	154	503.83	129	507.10	124	522.71
Original Research Proposal	11	470.90	155	534.11	130	502.08	124	530.06
Student-Generated Quiz/Exams	11	489.89	154	491.47	128	505.52	124	481.17
Concept Maps/Mind Maps	11	460.99	154	464.76	127	537.77	125	465.00
Campus Events	11	418.80	153	549.27	129	483.90	124	484.30
Film/Video Critique	11	470.67	155	542.47	132	508.77	124	459.40
Annotated Bibliography/Webliography	11	469.25	155	488.92	127	527.39	122	478.75
Self Assessment	11	438.32	153	537.34	130	506.28	124	458.44
Field Trips	11	412.36	154	519.42	128	518.10	124	490.94
Service Learning	11	409.53	151	485.67	127	484.18	125	515.39
Video Creation	11	477.23	155	533.62	128	524.98	125	464.12
Online Discussion	11	472.63	154	516.97	127	527.44	124	523.74
Reflective Blogs	11	481.09	155	516.52	129	501.55	124	497.86
Online Formative Quizzes	11	506.59	156	531.13	132	509.95	124	522.43
Online Collaborative Projects	11	483.47	153	525.47	129	547.55	125	482.56
Synchronous Online Lecture	10	531.25	156	520.83	132	500.25	125	521.83
Participation in Social Networking	11	460.87	154	491.65	128	481.32	124	548.40
Computer-Based Learning Exercises/Games Simulations	11	476.19	155	495.08	130	497.94	125	521.40

	0-3 years		4-7 years		8-11 years		12-15 years	
	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank
Project-based Learning	11	419.72	154	517.15	129	526.26	124	538.83
On-the-Job Training	11	405.03	153	512.22	128	496.39	125	514.40
Work-based Learning (SAE or SBE)	11	443.59	154	509.69	128	471.51	124	511.21

Part 2

	12-15 years		16-19 years		20-23 years		more than 23 years		
	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank	Total
Questioning	112	477.88	154	493.65	119	527.03	205	521.12	993
Whole Group Discussion	132	530.72	159	517.09	130	538.80	223	538.86	1072
Guided Practice	130	529.32	159	576.95	129	562.00	227	577.91	1073
Interactive Lecture	128	538.92	159	556.34	129	487.59	225	540.41	1070
Self-Directed Learning	130	582.08	158	597.88	131	532.99	227	540.45	1075
Major Writing Project	130	525.60	160	549.59	134	512.75	225	600.58	1079
Lab Activities	129	535.29	158	578.93	133	579.62	222	556.13	1072
Demonstrations	132	548.17	161	525.80	135	575.43	227	555.35	1084
Student Presentations	132	527.22	161	551.89	134	557.00	230	568.95	1091
Short Paper	127	508.61	155	528.20	128	533.26	217	549.36	1049
Student Peer Assessment	131	532.36	159	543.97	131	530.43	226	554.22	1074
Small-Group Discussion	132	542.91	159	518.85	132	566.39	228	539.82	1080
Online Discussions	132	540.50	157	531.68	127	535.54	226	524.42	1070
Quizzes	131	566.21	157	509.68	129	571.04	226	538.40	1071
Personal Reflection	131	496.08	157	539.61	133	495.86	220	549.86	1066
Cooperative Learning	131	543.48	158	553.32	131	522.82	221	543.22	1068
Learning Portfolio	131	549.61	156	542.40	131	554.10	226	567.47	1070
Student Attitude Survey	131	504.76	158	539.34	130	537.92	223	576.41	1070
Brainstorming	123	489.96	149	487.63	126	499.47	215	523.12	1005
Asynchronous Online	123	507.12	148	507.01	126	472.35	215	514.31	1007
Student Peer Teaching	124	516.40	150	545.31	125	502.79	217	502.80	1016
Review Sessions	124	532.40	150	522.93	125	468.18	221	530.98	1018
Literature Review	125	485.47	149	478.61	123	482.59	215	506.25	1009
Online/E-Portfolio	124	518.74	150	493.00	125	485.06	219	514.71	1011
Case Study	124	505.49	150	503.39	125	503.51	221	507.67	1019
Lecture	65	302.09	96	314.52	68	277.73	118	282.44	618

	12-15 years		16-19 years		20-23 years		more than 23 years		
	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank	Total
Question & Answer using clickers/Personal Response Systems	118	458.14	149	483.05	113	452.64	196	469.80	954
Guest Lecture	116	460.01	142	477.01	119	483.17	202	529.91	962
Think/Pair/Share	118	473.03	147	486.07	117	497.53	195	492.72	959
Minute Paper/Sentence Summary	118	461.97	148	494.23	118	451.87	207	511.82	975
Problem Based Learning	123	545.75	149	498.25	125	493.90	212	524.11	1002
Role Play	123	447.72	146	517.03	121	496.26	211	474.61	992
Games	104	412.61	132	458.58	107	428.29	184	425.58	890
Computer Simulations	124	507.86	148	512.03	124	520.88	217	504.11	1009
Debates	120	466.73	145	472.19	120	497.80	213	484.60	988
In-Class Informal Writing	124	522.71	148	506.23	126	497.15	214	529.42	1006
Original Research Proposal	124	530.06	149	499.56	122	471.52	218	511.60	
Student-Generated Quiz/Exams	124	481.17	151	533.03	125	513.21	216	513.85	1010
Concept Maps/Mind Maps	125	465.00	148	537.06	122	513.93	215	517.00	1002
Campus Events	124	484.30	149	494.40	122	511.70	213	527.73	1001
Film/Video Critique	124	459.40	149	476.49	123	506.72	219	547.11	1013
Annotated Bibliography/Webliography	122	478.75	148	512.23	123	497.75	213	512.73	999
Self Assessment	124	458.44	150	526.19	124	508.91	214	518.49	1006
Field Trips	124	490.94	150	507.56	125	498.96	213	532.69	1004
Service Learning	125	515.39	146	503.32	123	516.54	215	543.14	998
Video Creation	125	464.12	147	492.26	126	466.37	215	534.78	1006
Online Discussion	124	523.74	150	490.51	125	481.47	217	510.47	1008
Reflective Blogs	124	497.86	149	498.30	123	472.31	214	529.34	1005
Online Formative Quizzes	124	522.43	150	512.50	127	521.28	216	473.96	1016
Online Collaborative Projects	125	482.56	149	553.36	124	449.74	216	487.71	1009
Synchronous Online Lecture	125	521.83	149	523.25	124	449.22	214	492.81	1009
Participation in Social Networking	124	548.40	148	485.56	125	502.27	214	529.82	1004

	12-15 years		16-19 years		20-23 years		more than 23 years		
	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank	Total
Computer-Based Learning Exercises/Games Simulations	125	521.40	150	484.04	128	561.21	218	526.59	1019
Project-based Learning	124	538.83	149	517.08	124	493.18	218	509.19	1010
On-the-Job Training	125	514.40	149	534.96	126	500.75	214	528.75	1007
Work-based Learning (SAE or SBE)	124	511.21	148	505.76	124	528.98	215	523.67	1004

Appendix M

Classroom Instructional Strategy Use by Content Area

Part 1

	Agriculture Education		Business, Marketing, & Information Technology		Family Consumer Sciences & Human Services		Skilled Technical Sciences	
Classroom Strategy	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank
Questioning	104	467.21	303	483.53	226	509.54	89	516.25
Whole Group Discussion	113	536.03	321	521.94	246	556.68	100	570.73
Guided Practice	113	423.85	323	532.81	245	542.41	101	621.29
Interactive Lecture	112	521.42	317	545.79	247	551.35	100	524.77
Self-Directed Learning	114	470.12	323	563.13	247	542.14	99	522.12
Major Writing Project	113	584.43	326	548.83	248	565.32	100	415.50
Lab Activities	113	472.47	324	387.54	246	607.47	100	687.80
Demonstrations	114	466.21	328	477.93	247	534.27	98	707.73
Student Presentations	114	566.48	332	539.45	248	604.21	100	425.92
Short Paper	112	560.95	315	516.58	241	574.14	94	448.73
Student Peer Assessment	112	496.48	321	481.13	246	539.37	99	545.32
Small-Group Discussion	114	536.25	325	497.56	246	581.35	100	535.84
Online Discussions	114	455.67	317	556.53	245	546.36	100	499.32
Quizzes	114	538.42	316	506.14	246	487.83	100	608.14

	Agriculture Education		Business, Marketing, & Information Technology		Family Consumer Sciences & Human Services		Skilled Technical Sciences	
Classroom Strategy	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank
Personal Reflection	113	443.21	316	484.01	245	640.20	100	516.12
Cooperative Learning	114	504.75	318	451.39	244	618.76	100	567.83
Learning Portfolio	114	468.67	320	514.67	244	566.43	99	516.07
Student Attitude Survey	114	489.58	316	497.03	246	560.93	100	567.96
Brainstorming	110	438.70	298	483.88	232	521.63	93	505.26
Asynchronous Online	107	390.51	297	551.32	233	498.49	95	371.91
Student Peer Teaching	110	514.05	300	422.61	231	510.85	97	618.61
Review Sessions	109	501.86	303	457.29	232	496.79	97	608.28
Literature Review	110	506.69	297	442.93	232	519.71	97	587.90
Online/E-Portfolio	110	419.18	296	528.30	232	509.41	96	449.58
Case Study	110	395.36	303	557.68	233	508.43	97	417.48
Lecture	71	336.77	180	301.01	141	294.22	66	356.35
Question & Answer Using Clickers/Personal Response Systems	108	488.83	259	465.17	221	485.79	95	439.36
Guest Lecture	110	514.45	270	446.03	220	494.55	94	517.01

	Agriculture Education		Business, Marketing, & Information Technology		Family Consumer Sciences & Human Services		Skilled Technical Sciences	
Classroom Strategy	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank
Think/Pair/Share	108	516.27	262	436.33	227	536.71	93	429.16
Minute Paper/Sentence Summary	110	540.44	270	449.93	231	539.09	94	457.78
Problem Based Learning	110	470.86	288	483.50	231	434.05	95	543.26
Role Play	110	450.26	287	491.81	230	517.81	95	397.17
Games	102	478.62	261	442.81	200	508.86	82	376.52
Computer Simulations	110	430.15	298	607.90	231	410.72	93	439.10
Debates	108	603.84	290	480.24	225	480.38	94	500.83
In-Class Informal Writing	110	550.48	295	499.12	232	559.73	94	368.48
Original Research Proposal	110	543.58	297	489.91	232	511.08	95	441.41
Student-Generated Quiz/Exams	110	574.83	297	468.90	231	523.01	95	427.06
Concept Maps/Mind Maps	110	538.79	293	457.06	231	532.00	95	386.93
Campus Events	110	538.71	295	452.79	229	520.86	95	521.27
Film/Video Critique	110	494.35	110	494.35	232	555.78	95	491.62
Annotated Bibliography/Webliography	108	543.16	297	467.65	227	535.76	94	428.55
Self Assessment	109	432.15	295	456.22	230	570.26	94	496.40

	Agriculture Education		Business, Marketing, & Information Technology		Family Consumer Sciences & Human Services		Skilled Technical Sciences	
Classroom Strategy	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank
Field Trips	110	612.05	297	429.55	230	500.31	95	528.92
Service Learning	110	570.74	292	427.85	228	558.57	94	493.41
Video Creation	10009	461.90	295	518.24	232	532.09	95	440.67
Online Discussion	110	403.54	297	554.37	230	499.28	95	437.76
Reflective Blogs	110	472.01	294	515.92	231	528.24	95	452.62
Online Formative Quizzes	110	460.75	302	535.89	232	501.64	95	429.26
Online Collaborative Projects	110	481.70	297	555.44	232	522.62	95	337.28
Synchronous Online Lecture	109	467.53	299	532.26	230	489.03	94	421.44
Participation in Social Networking	109	534.32	293	523.52	233	500.95	96	449.34
Computer-Based Learning Exercises/Games Simulations	109	418.88	302	593.19	233	460.48	96	409.04
Project-Based Learning	110	477.45	297	508.90	232	473.30	95	521.17
On-the-Job Training	110	549.09	293	411.56	232	511.81	96	659.16
Work-based Learning (SAE or SBE)	110	704.61	293	431.00	230	463.61	96	597.39

Part 2

	Health Sciences		Engineering and Technology Education		Total
Classroom Strategy	N	Mean Rank	N	Mean Rank	
Questioning	115	526.16	158	498.73	995
Whole Group Discussion	123	591.20	171	482.03	1074
Guided Practice	122	533.30	171	571.08	1075
Interactive Lecture	123	603.38	173	467.26	1072
Self-Directed Learning	122	550.14	172	536.64	1077
Major Writing Project	121	626.30	173	475.88	1081
Lab Activities	124	577.46	167	649.70	1074
Demonstrations	124	583.21	175	609.67	1086
Student Presentations	124	609.73	175	492.30	1093
Short Paper	120	597.57	169	443.91	1051
Student Peer Assessment	124	624.34	174	605.12	1076
Small-Group Discussion	124	588.26	173	540.58	1082
Online Discussions	122	614.02	174	506.11	1072
Quizzes	123	686.91	174	514.77	1073

	Health Sciences		Engineering and Technology Education		Total
Classroom Strategy	N	Mean Rank	N	Mean Rank	
Personal Reflection	122	570.57	172	521.78	1068
Cooperative Learning	120	574.55	174	547.11	1070
Learning Portfolio	123	527.85	172	597.57	1072
Student Attitude Survey	123	599.25	173	541.97	1072
Brainstorming	109	502.49	165	559.37	1007
Asynchronous Online	110	579.37	167	531.77	1009
Student Peer Teaching	112	563.42	168	560.88	1018
Review Sessions	111	645.38	168	485.43	1020
Literature Review	111	587.50	164	496.75	1011
Online/E-Portfolio	112	517.85	167	549.47	1013
Case Study	111	699.17	167	435.30	1021
Lecture	55	352.63	107	280.57	620
Question & Answer Using Clickers/Personal Response Systems	110	566.19	163	446.58	956
Guest Lecture	109	523.32	161	457.59	964

	Health Sciences		Engineering and Technology Education		Total
Classroom Strategy	N	Mean Rank	N	Mean Rank	
Think/Pair/Share	111	541.82	160	439.23	961
Minute Paper/Sentence Summary	109	522.53	163	443.61	977
Problem Based Learning	111	503.77	169	625.28	1004
Role Play	109	679.93	163	447.21	994
Games	92	548.73	155	327.46	892
Computer Simulations	110	507.90	169	541.50	1011
Debates	109	558.71	164	426.82	990
In-Class Informal Writing	111	542.57	166	457.97	1008
Original Research Proposal	111	555.60	166	506.60	1011
Student-Generated Quiz/Exams	113	619.70	166	473.92	1012
Concept Maps/Mind Maps	111	632.01	164	497.09	1004
Campus Events	110	535.25	164	506.09	1003
Film/Video Critique	111	573.81	166	480.32	1015
Annotated Bibliography/Webliography	110	523.82	165	511.66	1001
Self Assessment	113	535.72	167	529.87	1008
Field Trips	109	570.85	165	509.56	1006

	Health Sciences		Engineering and Technology Education		Total
Classroom Strategy	N	Mean Rank	N	Mean Rank	
Service Learning	111	583.82	165	449.99	1000
Video Creation	111	538.82	166	483.07	1008
Online Discussion	111	564.05	167	493.93	1010
Reflective Blogs	111	523.61	166	486.64	1007
Online Formative Quizzes	111	636.27	168	466.46	1018
Online Collaborative Projects	111	518.83	166	498.39	1011
Synchronous Online Lecture	111	576.85	168	507.96	1011
Participation in Social Networking	111	534.17	164	461.82	1006
Computer-Based Learning Exercises/Games Simulations	113	579.31	168	505.41	1021
Project-Based Learning	112	410.04	166	624.55	1012
On-the-Job Training	112	560.49	166	504.60	1009
Work-based Learning (SAE or SBE)	110	517.11	167	490.23	1006

Appendix N

Classroom Instructional Strategy Use by Type of School

	Area Career Center		Comprehensive High School		Community College		4-Year University		I am not sure		
Classroom Strategies	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank	Total
Questioning	260	511.35	637	477.56	44	518.57	16	623.31	26	526.58	983
Whole Group Discussion	281	548.00	685	518.69	47	586.69	22	627.77	27	510.39	1062
Guided Practice	282	581.42	686	511.33	47	544.73	20	515.73	28	530.91	1063
Interactive Lecture	284	527.62	679	528.67	47	575.66	21	645.90	29	444.79	1060
Self-Directed Learning	279	547.04	690	521.79	47	576.05	20	568.88	29	570.05	1065
Major Writing Project	282	521.88	692	531.99	46	574.07	21	865.67	28	429.34	1069
Lab Activities	284	651.06	684	480.14	47	631.84	20	432.45	27	473.76	1062
Demonstrations	284	625.48	693	502.45	48	607.19	21	472.60	28	441.77	
Student Presentations	289	528.81	695	544.66	49	554.74	20	804.45	28	363.75	1081
Short Paper	271	512.80	673	511.60	46	630.89	21	739.93	28	444.39	1039
Student Peer Assessment	280	568.16	689	520.65	47	497.28	20	756.70	28	366.36	1064
Small-Group Discussion	282	562.84	689	519.76	48	537.95	22	734.77	29	488.40	1070
Online Discussions	281	556.81	684	512.31	47	596.12	20	685.63	28	489.86	1060
Quizzes	283	562.20	683	513.00	47	645.20	20	432.60	28	533.43	1061
Personal Reflection	279	522.89	681	524.86	48	538.48	20	759.70	28	490.79	1056
Cooperative Learning	280	545.71	682	521.64	47	546.88	20	561.73	29	507.36	1058
Learning Portfolio	281	589.41	685	507.59	46	491.24	20	654.50	28	475.71	1060
Student Attitude Survey	284	555.37	682	515.19	48	605.55	19	588.53	27	481.24	1060
Brainstorming	259	529.44	644	486.13	47	470.77	17	614.62	29	473.76	996
Asynchronous Online	260	488.98	644	499.17	47	535.93	19	619.68	28	461.96	998
Student Peer Teaching	265	580.57	647	471.92	48	457.58	18	585.44	29	546.31	1007
Review Sessions	267	550.39	647	487.34	48	518.66	19	437.18	28	502.79	1009
Literature Review	264	588.38	643	459.06	47	559.02	19	625.11	27	438.44	1000
Online/E-Portfolio	265	528.27	644	492.98	48	469.28	18	641.33	28	427.50	1003
Case Study	268	524.49	646	492.09	49	574.55	19	702.47	28	378.63	1010
Lecture	161	327.13	399	291.78	27	415.76	10	315.75	16	295.03	613

	Area Career Center		Comprehensive High School		Community College		4-Year University		I am not sure		
Classroom Strategies	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank	Total
Question & Answer Using Clickers/Personal Response Systems	252	483.89	608	469.91	45	439.29	14	441.36	26	515.17	945
Guest Lecture	252	504.46	613	464.52	48	504.07	17	596.26	24	388.77	954
Think/Pair/Share	254	466.75	612	477.32	45	400.17	14	635.32	26	580.69	951
Minute Paper/Sentence Summary	254	461.09	622	492.21	46	418.98	17	619.41	27	517.89	966
Problem Based Learning	265	528.15	636	480.74	48	566.56	17	531.00	27	429.20	993
Role Play	261	534.36	633	479.28	46	450.52	17	548.85	26	412.60	983
Games	233	440.09	566	457.30	39	255.18	16	361.66	28	439.00	882
Computer Simulations	262	507.43	644	499.22	48	490.98	18	413.17	28	537.52	1000
Debates	257	518.16	633	484.34	46	421.68	18	566.47	26	436.21	980
In-Class Informal Writing	261	474.59	643	509.00	48	507.83	18	519.97	27	467.22	997
Original Research Proposal	262	506.31	644	497.66	48	470.90	19	688.45	27	432.26	1000
Student-Generated Quiz/Exams	265	517.86	642	499.82	48	423.19	18	535.00	28	479.91	1001
Concept Maps/Mind Maps	261	461.78	641	513.70	47	407.54	18	637.44	26	503.46	993
Campus Events	263	528.84	636	480.83	48	500.86	18	642.97	27	445.22	992
Film/Video Critique	266	514.12	646	495.77	47	461.17	19	691.71	26	487.23	1004
Annotated Bibliography/Webliography	258	488.75	640	497.58	46	455.78	19	631.45	27	482.63	990
Self Assessment	264	537.68	641	483.51	47	478.61	18	588.08	27	464.56	997
Field Trips	262	535.57	639	493.48	48	437.06	19	473.45	27	365.89	995
Service Learning	258	550.39	640	484.74	47	382.20	17	535.59	27	379.65	989
Video Creation	261	464.51	645	512.18	48	458.02	17	658.79	26	489.50	997
Online Discussion	264	498.87	643	486.40	47	593.48	18	716.33	27	528.06	999
Reflective Blogs	264	486.93	642	497.30	46	536.20	18	608.39	26	502.71	996
Online Formative Quizzes	265	506.87	649	509.30	48	423.80	18	514.11	27	484.22	1018

	Area Career Center		Comprehensive High School		Community College		4-Year University		I am not sure		
Classroom Strategies	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank	Total
Online Collaborative Projects	261	461.59	643	515.54	48	458.01	19	691.16	29	462.57	1000
Synchronous Online Lecture	261	467.03	645	508.13	49	559.98	17	570.53	28	490.23	1000
Participation in Social Networking	262	509.55	641	494.87	48	488.99	17	570.24	27	430.83	995
Computer-Based Learning Exercises/Games Simulations	266	502.45	651	509.02	46	469.12	18	437.78	29	554.34	1010
Project-based Learning	263	504.76	646	503.98	46	460.34	18	533.64	28	442.73	1001
On-the-Job Training	264	632.00	642	444.90	46	534.22	18	646.14	28	350.80	998
Work-based Learning (SAE or SBE)	261	590.79	642	464.27	45	464.44	19	565.37	28	414.64	995

Appendix O

Covid Effects

Teachers Whose Classroom Instructional Strategies Were Affected by COVID-10, by Region

Region	N	Mean Rank
Northeast	64	566.55
South	315	507.44
Midwest	418	460.54
Pacific	192	525.76
Total	989	

Teachers Whose Classroom Instructional Strategies Were Affected by COVID-10, by Subject Area

Subject Area	N	Mean Rank
Agriculture Education	108	459.81
Business, Marketing, & Information Technology	301	423.16
Family Consumer Sciences & Human Services	225	541.91
Skilled Technical Sciences	93	499.48
Health Sciences	110	602.18
Engineering and Technology Education	165	550.62
Total	1002	

Teachers Whose Classroom Instructional Strategies Were Affected by COVID-10, by Region

	Traditional method through a 4-year University with student teaching		Alternative or Innovative Certification method		Career Education Certification method: Traditional CTE coursework		Career Education Certification method: CTTE cohort courses		
	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank	Total
Questioning	512	492.17	200	471.01	207	528.50	76	525.26	995
Whole Group Discussion	551	528.40	214	511.67	222	577.39	87	556.87	1074
Guided Practice	554	538.84	212	480.35	222	580.86	87	563.78	1075
Interactive Lecture	550	530.63	211	503.87	223	584.04	88	530.95	1072
Self-Directed Learning	554	541.59	214	557.88	222	548.88	87	450.83	1077
Major Writing Project	555	543.87	214	533.03	224	554.59	88	507.71	1081
Lab Activities	552	505.53	212	512.41	221	618.04	89	595.56	1074
Demonstrations	560	501.65	211	503.60	227	639.54	88	657.77	1086
Student Presentations	563	552.43	214	534.14	227	551.91	89	531.07	1093
Short Paper	544	517.85	207	519.97	216	564.76	84	493.97	1051
Student Peer Assessment	551	534.08	214	512.08	224	584.13	87	514.00	1076
Small-Group Discussion	556	548.18	215	497.59	224	563.35	87	551.03	1082
Online Discussions	549	529.79	214	509.93	222	570.04	87	558.60	1072
Quizzes	546	496.44	215	544.40	225	621.08	87	555.81	1073
Personal Reflection	545	528.56	212	538.40	223	555.14	88	509.61	1068
Cooperative Learning	550	539.40	212	522.96	221	536.54	87	538.80	1070
Learning Portfolio	551	529.87	213	510.40	222	580.68	86	529.56	1072
Student Attitude Survey	550	517.72	212	518.34	222	606.69	88	520.59	1072
Brainstorming	524	504.83	198	501.33	206	494.49	79	529.94	1007
Asynchronous Online	522	496.34	202	521.45	205	524.49	80	470.04	1009
Student Peer Teaching	524	503.85	201	474.18	212	537.47	81	560.48	1018
Review Sessions	527	488.72	203	468.45	208	578.78	82	581.36	1020
Literature Review	524	477.20	201	481.69	206	562.26	80	610.83	1011
Online/E-Portfolio	525	494.02	201	524.55	206	528.58	81	492.69	1013

	Traditional method through a 4-year University with student teaching		Alternative or Innovative Certification method		Career Education Certification method: Traditional CTE coursework		Career Education Certification method: CTTE cohort courses		
	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank	Total
Case Study	530	497.44	201	522.27	208	529.23	82	524.77	1021
Lecture	317	286.70	123	302.67	123	351.61	57	371.06	620
Question & Answer using clickers/Personal Response Systems	485	471.24	191	460.33	203	511.15	77	483.23	956
Guest Lecture	494	470.89	189	455.71	201	520.25	80	522.64	964
Think/Pair/Share	491	496.69	188	463.04	204	474.25	78	443.21	961
Minute Paper/Sentence Summary	507	498.48	190	468.59	200	496.47	80	458.69	977
Problem Based Learning	513	495.34	200	496.89	210	523.08	81	508.38	1004
Role Play	513	469.40	196	505.51	203	555.88	82	509.61	994
Games	468	448.64	171	470.56	182	437.95	71	396.36	892
Computer Simulations	522	502.45	201	555.22	209	475.11	79	485.94	1011
Debates	514	496.55	196	471.92	199	491.39	81	555.99	990
In-Class Informal Writing	520	518.07	201	502.84	206	492.96	81	450.88	1008
Original Research Proposal	525	502.54	200	486.99	204	531.16	82	511.92	1011
Student-Generated Quiz/Exams	525	510.27	197	465.15	209	527.12	81	529.42	1012
Concept Maps/Mind Maps	520	532.75	199	464.23	204	476.01	81	469.04	1004
Campus Events	522	481.49	196	484.55	204	552.86	81	548.30	1003
Film/Video Critique	526	513.33	201	481.27	207	503.30	81	551.73	1015
Annotated Bibliography/Webliography	520	513.35	198	497.09	204	480.76	79	481.73	1001
Self Assessment	523	501.74	198	483.88	207	540.07	80	481.54	1008
Field Trips	522	498.98	200	483.31	204	517.00	80	549.06	1006
Service Learning	520	499.28	199	453.65	201	547.54	80	506.76	1000
Video Creation	523	500.22	199	507.09	205	499.66	81	538.01	1008
Online Discussion	522	495.00	198	502.79	209	539.46	81	492.17	1010

	Traditional method through a 4-year University with student teaching		Alternative or Innovative Certification method		Career Education Certification method: Traditional CTE coursework		Career Education Certification method: CTTE cohort courses		
	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank	Total
Reflective Blogs	523	501.93	198	512.23	205	505.92	81	492.35	1007
Online Formative Quizzes	529	489.36	200	529.38	207	547.03	82	496.20	1018
Online Collaborative Projects	525	520.66	199	522.96	207	472.97	80	453.08	1011
Synchronous Online Lecture	525	489.83	199	520.81	206	541.32	81	484.56	1011
Participation in Social Networking	523	500.84	197	479.48	205	538.55	81	490.38	1006
Computer-Based Learning Exercises/Games Simulations	528	507.24	203	551.53	209	495.68	81	473.42	1021
Project-based Learning	527	504.61	199	517.01	206	493.89	80	525.29	1012
On-the-Job Training	524	487.05	198	433.46	206	592.03	81	574.65	1009
Work-based Learning (SAE or SBE)	523	504.81	199	423.05	205	561.89	79	545.96	1006